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ABSTRACT

Intended for teaching licensed practical nurses, this curriculum guide provides information related to the equipment and skills required for nursing care of patients needing intravenous (IV) therapy. It also explains the roles and responsibilities of the licensed practical nurse with regard to intravenous therapy. Each of the 15 instructional units consists of eight basic components: performance objectives, teacher activities, information sheets (content essential for meeting the cognitive objective), assignment sheets (applications of knowledge that are prerequisites to skill development), job sheets (procedures to complete a manipulative or psychomotor skill), transparency masters, tests, and test and assignment sheet answers. The units cover roles and responsibilities; anatomy and physiology of the circulatory system and skin; considerations for IV therapy; preparation and assessment for IV therapy; solutions and containers; equipment and supplies; accessory equipment; venipuncture process; problems and complications; monitoring and maintenance of the IV; medications; blood, blood products, and volume expanders; special catheters; parenteral nutrition; and pediatric IV therapy. (YLB)

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Intravenous Therapy

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DEDICATION

This curriculum manual is fondly dedicated to my loving parents who taught me that it is greatly satisfying to give care and love to fellow humans.

It is also dedicated to a terrific husband and three sons who patiently shared the load and lightened it with humor during the three years it took to write, revise, and rewrite this manual.

Last but not least, this material is dedicated to all of those nurses in the field who are doing a magnificent job of providing quality, tender loving care, often under very difficult conditions.

Barbara Galliart

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FOREWORD

Three years ago, the licensed practical nurses in the State of Oklahoma requested the aid of the Vocational Technical Education system. Their request was for education about intravenous therapy. This nursing skill is covered only lightly in the Practical Nursing curriculum, and the LPNs felt that they needed a formal class to increase their knowledge and skills.

In answer to their requests, *Intravenous Therapy* has been developed to meet the increased educational needs of the already licensed practical nurse. This comprehensive curriculum was developed to provide information related to the equipment and skills required for quality nursing care of the patient requiring intravenous therapy. It also explains the roles and responsibilities of the licensed practical nurse with regard to intravenous therapy.

Francis Tuttle, Director
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Education

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PREFACE

Twenty-five years ago, intravenous therapy was prescribed only for an occasional hospital patient. Today it is only the occasional hospital patient who does not have intravenous therapy prescribed at some time during the hospital stay. In addition, intravenous therapy is increasingly being used outside the hospital setting, such as at home or in the physician's office.

The administration of IV therapy requires great knowledge and skill in any health care setting. Increasing demands on the nurse's time make it essential for the nurse to know the quickest and/or easiest way to perform a skill without compromising patient safety or comfort. Also, the equipment available for intravenous therapy is becoming more complicated and sophisticated and requires greater knowledge for its use.

Due to the greater use of intravenous therapy and the increasingly complicated equipment, it is essential for the nurse to be offered a chance to obtain new knowledge and skills in this area. With the completion of *Intravenous Therapy*, we can now offer a comprehensive guide to instructors--who are first nurses and usually incidently teachers--to use in teaching intravenous therapy.

Intravenous Therapy is designed to allow a progressive couse of study, but it can also be taught in separate units. The manual offers many practical items of information to assist the nurse toward a greater competency and increased confidence, and to provide increased comfort for the patient.

Barbara Galliart, Curriculum Writer
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  Center
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  and Technical Education

ACKNOWLEDGEMENTS

The development of curriculum is a process that can be compared with that of nursing a patient through an illness. They both are processes that take much planning and cooperation among many people of various expertise. Everyone involved must have a concerned and caring attitude and make a committed, combined effort to bring forth a successful outcome. Health professionals involved in the writing of *Intravenous Therapy* are truly a dedicated group of individuals. Without their enthusiastic support and cooperation, this project would not have been possible.

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A special thank you to Yvonne Bender, without whom this project would never have been started. Thanks also to Joyce Sawatzky, Assistant Coordinator for Development. Without her sincere kindness and encouragement, this nurse would never have had the courage to become a writer.

Thank you also to all the CIMC editors. They have all been patient with me and have had an extra job of making sure my grammar was accurate. They have also kindly and gently aided me in learning the correct format. CIMC must have the "best" editors available. I very sincerely thank Terra McCluskey, Susan Walker, Terri Perry, Jerry Weir, Lynne Murnane, Sue Buck, Barbara Harrison, and Marla Hamilton. Thank you also to the Graphics Division for the typing, artwork, and printing of this publication.

It has taken an extra measure of understanding and patience from all the staff at CIMC because I had never written anything other than a letter or school project before. With all the patience, understanding, and combined efforts of many people, we have produced a project of which we can all be justifiably proud.

USE OF THIS PUBLICATION

Instructional Units

Intravenous Therapy includes fifteen instructional units. A standard format was established in 1970 for the development of instructional materials for all Oklahoma vocational teachers. This format includes eight basic components that form a unit: performance objectives, suggested activities for the teacher, information sheets, assignment sheets, job sheets, transparency masters, tests, and answers to tests and assignment sheets. Depending on the specific objectives, there may or may not be transparency masters, assignment sheets, or job sheets included in the unit of instruction.

All of the unit components "zero in" on measurable and observable learning outcomes. Teachers are encouraged to supplement, personalize, localize, and motivate with these materials in order to develop a complete teaching/learning process.

Units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the teacher will help him or her determine the following

A. Amount of material that can be covered in each class period
B. Skills that must be demonstrated
  1. Supplies and equipment needed
  2. Amount of practice needed
  3. Amount of class time needed for demonstrations
C. Supplementary materials, such as pamphlets and filmstrips, that must be ordered
D. Resource people who must be contacted

Performance Objectives (white pages)

Each unit of instruction is based on the performance needed for safe and effective equipment operation. Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction; and specific objectives, stating the student performance necessary to reach the unit objective.

Since the objectives of the unit provide direction for the teaching/learning process, it is important that teachers and students have a common understanding of the intent of the objectives. Following is a list of performance terms, their meanings, and behavioral synonyms that may have been used in this material.

A. Name--The individual supplies a name for objects, events, or people

Behavioral synonyms: Label, list, letter, record, reiterate, repeat, write

B. Identify--The individual selects a named, described, or pictured object by pointing to it, touching it, picking it up, or selecting it

Behavioral synonyms: Select, mark, match, choose, judge

C. State a rule--The individual communicates a relationship or principle that could be used to solve problems or perform a task

D. Apply a rule--The individual supplies an answer to a problem by using a stated relationship or principle

Behavioral synonyms: Solve, calculate

E. Describe--The individual relates sufficient characteristics or properties of an object or event so that a second individual will be able to state what is being discussed

Behavioral synonyms: Define, discuss, interpret, recite, tell how, tell what happens when

F. Distinguish--The individual selects an object or event from two or more that are easily confused

Behavioral synonyms: Discriminate, differentiate

G. Order--The individual arranges three or more objects or events in a sequence based on a stated property

Behavioral synonyms: Arrange, sequence, list in order, classify, divide, isolate, sort

H. Construct--The individual makes a physical object, a verbal statement, or a drawing

(NOTE: *Construct* is used when the finished product or result is important.)

Behavioral synonyms: Draw, make, build, design, formulate, reproduce, transcribe, convert, put together, compile

I. Demonstrate--The individual performs several operations necessary to carry out a specified process

(NOTE: *Demonstrate* is used when it is desirable to watch the student perform a task, one of the highest levels of student performance.)

Behavioral synonyms: Show your work, show procedure, perform an experiment, perform the steps, operate, remove, replace, turn off/on, (dis) assemble, (dis) connect

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Prepare for each unit by deciding how each objective can best be taught in accordance with your own methods and experience.

The objective sheet may also be used as a quick pretest to determine prior knowledge of students and to determine whether further study or activities are necessary. Teachers should feel free to modify, delete, or add objectives in order to meet the needs of the students and department. When changes in objectives are made, the teacher should remember to supply the needed information, assignment and/or job sheets, and criterion test items.

Suggested Activities (pink pages)

This component is included only in teacher material. The suggested activities page assists teachers during the preparation stage of the teaching/learning process by providing suggestions for delivery and/or presentation during the instructional process. Read the suggested activities before teaching the units so that supplemental materials can be obtained, audiovisual materials prepared, and outside resources contacted. Duties of the teacher will vary according to the particular unit.

The references that are listed are ones used in the development of each unit. They should be used by the teacher to supplement knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Information Sheet (green pages)

The information sheet provides "must know" content essential for meeting the cognitive (knowledge level) objectives of the unit. The information is written in a topical outline form and is keyed to the specific objectives.

Teachers will find that the information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. The information sheet may also be used for coordination activities and advisory committees.

Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and teachers to add notes that supplement, localize, personalize, or provide motivation for each unit.

Transparency Masters (white pages in teacher material and green in student material)

Transparency masters provide information in a special way. Transparencies direct the class's attention to the topic of discussion. Transparencies may present new information, or they may reinforce information presented in the information sheet. They are particularly effective when identification is necessary. Transparencies should be made and placed in the notebook where they will be immediately available for use.

Assignment Sheet (brown pages)

Assignment sheets give students a chance at problem solving, self-assessment, and/or practical experience with the information. They assist students in the application of knowledges that are necessary prerequisites to skill development. These may be given to the student for completion in class or used for homework assignments. Answer sheets are provided when appropriate and can be used by the student and/or teacher for checking student progress.

Job Sheets (blue pages)

Job sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure needed to complete each task or job. Diagrams, photographs, and illustrations are provided to assist students in achieving the skill.

A teacher should demonstrate to students the procedures outlined in each job sheet. Furthermore, the teacher needs to localize the job sheet according to the equipment and supplies available in the local situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Test (yellow pages)

This component provides criterion-referenced evaluation of every objective listed in the unit of instruction. It is crucial to note that both paper/pencil and performance objectives must be evaluated.

The tests may be written or oral. It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered. A selection of questions from the units covered may be used for final tests at the end of each term if desired. If objectives have been added, deleted, or modified, be sure to make the changes on the test.

The acceptable response on a unit test--eighty-five percent in most units--may be raised or lowered to fit the topic or students' ability levels. The percentage applies to the overall score, not to each question. The final unit grade should be obtained by using the paper/pencil score along with teacher evaluations of student demonstrations of the desired skills.

Answers to Test and Assignment Sheets (pink pages)

These components are designed to assist the teacher in evaluation of student performances.

Page Numbering

Each publication from the Curriculum and Instructional Materials Center is assigned a specific abbreviation. For example, *Intravenous Therapy* has been abbreviated IVT. The units are then numbered consecutively. An example of a page number is IVT - 1. Because CIMC publications are loose leaf, this system of page numbering was adopted so that pages from different manuals would not get mixed up.

Method of Disseminating Material

Material may be given out a unit or page at a time to keep the material before the student always new. Some teachers ask students to furnish a three-ring binder for the current unit of study. This is more convenient for taking the material home to study. Upon completion, each unit is then placed in a larger binder. The large binders may be purchased at cost from the CIMC. Some teachers store the material by units in filing cabinets or boxes until needed. All the units may be given out at once if desired.

Student materials should be provided for each student for best results. Student materials contain everything but the test answers, answers to assignment sheets, and suggested activities. The tests are collated at the back of student material and should be removed and stored until needed. Students should be allowed to take their materials home at the end of the year.

Teaching Methods

It is a challenge to keep students motivated. Supplement the objectives by providing the "why," personal experiences, and current information. Prepare for each unit by deciding how each objective can best be taught. Allow students to become involved in preparing and planning.

ROLES AND RESPONSIBILITIES
UNIT I

UNIT OBJECTIVE

After completing this unit, the student should be able to practice the appropriate legal and ethical aspects of his or her role in IV therapy. The student should also be able to interpret and communicate doctors' orders. This knowledge will be shown by completing the assignment sheet and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with roles and responsibilities to their correct definitions.
2. Match abbreviations associated with roles and responsibilities to their correct terms.
3. Discuss Oklahoma legislation and standards for IV therapy.
4. State rules regarding nursing ethics and patient rights as applied to IV therapy.
5. State points regarding doctors' orders to be considered by the nurse.
6. Select from a list points to be considered in the interpretation and communication of doctors' orders.
7. Interpret and communicate doctors' orders.

ROLES AND RESPONSIBILITIES
UNIT I

SUGGESTED ACTIVITIES

I. Suggested activities

  A. Make transparency.

  B. Pretest students to assess their present knowledge of the subject.

  C. Provide students with objective sheet.

  D. Provide students with information and assignment sheets.

  E. Discuss unit and specific objectives.

  F. Discuss information sheet.

  G. Individualize instruction for students with special needs.

  H. Use transparency to discuss completed assignment sheet.

  I. Provide students with list of instructional materials included in this unit.

  J. Invite an attorney to speak on the nurse's legal role regarding IV therapy.

  K. Give test.

  L. Discuss test.

  M. Reteach if necessary.

II. Instructional materials

  A. Objective sheet

  B. Suggested activities

  C. Information sheet

  D. Transparency master: TM #1--Sample Kardex Card

  E. Assignment Sheet #1--Interpret and Communicate Doctors' Orders

  F. Answers to assignment sheet

  G. Test

  H. Answers to test

SUGGESTED ACTIVITIES

III. Unit references

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B. Cohen, Michael R. "Have Your Ward Clerk Keep You Current on New Orders." *Nursing79*, Vol. 9, No. 2, (February 1979), p. 88D.

C. Plumer, Ada L. *Principles and Practices of IV Therapy*, 2nd ed. Boston: Little, Brown, and Co., 1975.

D. Rozovsky, Lorne Elkins. "Answers to the 15 Legal Questions Nurses Ask." *Nursing78*, Vol. 8, No. 7, (July 1978), pp. 73-77.

E. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medications: A Guide to Preparation, Administration and Nursing Management*. Philadelphia: J.B. Lippincott Co., 1980.

F. Sandroff, Ronnie. "Booby Trapped Order." *RN*, Vol. 44, No. 11, (November 1981), pp. 24-31.

G. State of Oklahoma Nurse Practice Act.

H. Thomas, Clayton L. *Taber's Cyclopedic Medical Dictionary,* 14th ed. Philadelphia: F.A. Davis Co., 1981.

IV. Recommended additional reading

A. Bullough, Bonnie. "Nurse Practice Acts." *Nursing77*. Vol. 7, No. 2, (February 1977), pp. 73-81.

B. Horsley, Jack E. "Short Staffing Means Increased Liability for You." *RN*, Vol. 43, No. 2, (February 1980), pp. 91-92.

C. Kelley, Nancy Perpall. "Taking the Error Out of Phone Orders." *Nursing78*, Vol. 8, No. 10, (October 1978), pp. 19-20.

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F. Regan, William Andrew. "Verbal Orders Are Invitations to Disaster." *RN*, Vol. 43, No. 6, (July 1980), pp. 61-64.

G. Sandroff, Ronni. "Protect the M.D.--Or the Patient?" *RN*, Vol. 44, No. 2, (February 1981), pp. 28-33.

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I. Vereb, Valerie. "Reality Shock: Are We Coping or Copping Out?" *RN*, Vol. 44, No. 1, (February 1981), pp. 91-92.

ROLES AND RESPONSIBILITIES
UNIT I

INFORMATION SHEET

I. Terms and definitions

A. Certification--Written or printed statement testifying to skill or qualification

B. Communication--Act of giving or exchanging information by talking, gesturing, or writing

C. Discretion--Freedom or power to make decisions and choices

D. Institution--Organization having a social, educational, or religious purpose

EXAMPLES: School, church, hospital

E. Interpret--To explain the meaning of; to clarify or translate

F. Job description--Written statement that describes and details work to be performed

G. Kardex--Written communication tool

H. Nurse Practice Act--Document that outlines laws regulating nursing

I. Policy--Governing principle or plan; a plan of action

J. Procedure--Act, method, or manner of proceeding in an action

K. Responsibility--Obligation to perform a task in a certain manner

L. Standard--Something established as a rule or basis of comparison in measuring or judging something else

II. Abbreviations

A. Amp--Ampule

B. KCl--Potassium chloride

C. KVO (or KO or KOR)--Keep vein open

D. LR (or RL)--Lactated Ringer's

E. M.V.I.--Multivitamin infusion

F. $\bar{q}$--Every

INFORMATION SHEET

III. Oklahoma legislation and standards for IV therapy

  A. Oklahoma Nurse Practice Act--Does not prohibit any nurse from starting and/or maintaining IV therapy

  (NOTE: There is no specific distinction per license title.)

  EXAMPLE: RN versus LPN

  B. Standards that the nurse must follow

  (NOTE: Policies are set by the institution itself.)

    1. Nurse *must* assume responsibility of obtaining and knowing the institution's policies and procedures regarding IV therapy

    (NOTE: Never accept word-of-mouth authorization in place of written policy.)

    2. Insititution may require certification or other evidence of specific training

    3. Nurse should obtain and know the job description regarding his or her specific role with IV therapy

    (NOTE: Institutions may have different policies and job descriptions regarding the nurse's role [RN and LPN] in different areas of the same hospital.)

    EXAMPLE: LPN in specialty area is allowed to, by policy and job description, start IVs; whereas, LPN on the general floor cannot.

IV. Nursing ethics and patient rights as applied to IV therapy

  A. Nursing ethics

    1. Each nurse must be responsible for his or her own actions

    2. Each nurse must be aware of self-limitations and never endanger a patient

  B. Patient rights

    1. Patients have the right to refuse any or all treatment and therapy

    (NOTE: The nurse's approach to the patient before therapy is begun can often mean acceptance or refusal of therapy.)

    2. Patients have the right to know the reason for therapy and the expected results

INFORMATION SHEET

V. Points regarding doctors' orders to be considered by the nurse

A. IV therapy can be initiated only by a doctor's order

B. Orders must be interpreted by nurse and then communicated to proper people as set by policy of the institution

EXAMPLE: Order is placed on patient's Kardex, medication card, and/or IV board; if there is an IV team, it must be notified.

C. Orders may leave much to the nurse's discretion

EXAMPLE: $D_5$1/2 NS; run at a rate to keep urine output at 50 ml/hr

D. Orders must be readable and reasonable; if they are not, the doctor must be contacted for clarification

(NOTE: If you are unsure whether an order is reasonable, consult a more experienced nurse before contacting the physician.)

E. Orders taken by telephone must be repeated back to the physician

(NOTE: Any telephone order must be fully understood and must contain reasonable medical treatment.)

VI. Points to be considered in the interpretation and communication of doctors' orders (Assignment Sheet #1)

A. Solution(s) ordered

EXAMPLE: D_5W

B. Volume of solution ordered

EXAMPLE: 1000 ml or 500 ml

C. Amount of time in which a specified volume of fluid is to infuse

EXAMPLE: Give 1000 ml in 8 hr; run at 125 ml/hr

D. Which solution should be infused first, second, third, and so on

(NOTE: Using the following example, the D_5W would be the first solution, D_5LR would be the second solution, and $D_5$1/2 NS would be the third.)

EXAMPLE: Doctor's order could read "D_5W, D_5LR, $D_5$1/2 NS"

E. Time schedule on which the solutions should be placed (will depend upon specified infusion time and time first infusion was begun)

F. Where IV orders are to be written for communication to other nurses

EXAMPLES: Kardex, IV board, medication card

INFORMATION SHEET

G. How orders should be written on communication tool

EXAMPLE: A doctor's order of "D_5W, D_5LR, $D_5$1/2 NS, give 1000 ml $\bar{q}$ 8 hours" would be written on the Kardex as follows:
D_5W 1000 ml 8 A.M.
D_5LR 1000 ml 4 P.M.
$D_5$1/2 NS 1000 ml 12 A.M.

H. Whether or not medications are to be added to the solution

EXAMPLE: KCl, M.V.I.

I. How the medication that is to be added should be written on communication tool

EXAMPLE: D_5W 1000 ml $\bar{c}$ 20 mEq KCl, D_5LR, $D_5$1/2 NS $\bar{c}$ 20 mEq KCl

Sample Kardex Card

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	

ROLES AND RESPONSIBILITIES
UNIT I

ASSIGNMENT SHEET #1--INTERPRET AND COMMUNICATE DOCTORS' ORDERS

NAME ______________________________ SCORE ______________

This assignment sheet is designed to give you, the nurse, experience in the interpretation of doctors' orders for IV therapy and to give you practice in transferring these orders from the chart to an appropriate communication form, such as the Kardex. It is very important, both legally and ethically, for you to use great care in both the interpretation and communication of all doctors' orders.

PART I--Write your interpretation of each of the following doctors' orders.

A. Patient Soo U. Arre, hospital number 45260, returns from the recovery room to room 116 at 1 P.M., April 16. An existing IV and a solution of normal saline are in place with 500 ml left in the container. The doctor's orders read as follows:

1L D_5W
1L D_5LR
1L $D_5$1/2 NS
Alternate $\bar{q}$ 8 hr. Add 20 mEq KCl to first 2 bottles daily

____

____

____

____

B. Patient I. Will Carey, hospital number 24630, is admitted to Room 222 from the doctor's office at 9 A.M., April 16. The doctor's orders read as follows:

Start an IV immediately
Insert Foley catheter and NG tube
Give these fluids
2L D_5W
1L $D_5$1/4 NS
Infuse at 1000 ml $\bar{q}$ 8 hr

____

____

____

____

ASSIGNMENT SHEET #1

C. Patient Will B. Done, hospital number 44400, is admitted from emergency room to room 432 at 2 A.M., April 16, with the following orders:

An IV of 500 ml LR has been started in ER
800 ml D_5W
1000 ml $D_5 1/2$ NS
Alternate $\bar{q}$ 8 hr. Add 20 mEq KCl to each bottle.

D. Patient Babe B. Doe, hospital number 73132, is admitted to room 713 at 4 P.M., April 16. The doctor is notified and orders the following:

Plasmalyte 56 100 ml $\bar{q}$ 12 hr
Add M.V.I. amp ṫ to one bottle daily

E. Patient V. Kidder, hospital number 74801, is admitted from emergency room to coronary unit bed 2 at 6 A.M., April 16. The IV order reads as follows:

D_5W KVO

ASSIGNMENT SHEET #1

PART II--Using the sample Kardex cards below, write your communication of the doctors' orders given in Part I.

A.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	

B.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	

C.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	

ASSIGNMENT SHEET #1

D.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	

E.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	

ROLES AND RESPONSIBILITIES
UNIT I

ANSWERS TO ASSIGNMENT SHEET

PART I

(NOTE: Most hospitals require a doctor's order for the renewal of the IV solutions every twenty-four hours.)

A. The first solution to be infused is D_5W, the second is D_5LR, and the third is $D_5$1/2 NS. The amount of solution to be infused every eight hours is 1000 ml. These solutions are to be alternated every eight hours until discontinued or the order is changed. The KCl (potassium chloride) is to be added to the D_5W and D_5LR.

B. The venipuncture must be done as soon as possible. The first solution to be infused is D_5W, the second is D_5W, and the third is $D_5$1/4 NS. The amount to be infused is 1000 ml every eight hours.

C. The first solution to be infused is the D_5W, the second is $D_5$1/2 NS, the third is D_5W, and the fourth is $D_5$1/2 NS. The solutions would continue to be alternated in this order until discontinued or changed. The amount of D_5W to be infused is 800 ml (not 1000 ml) over an eight-hour period. The amount of $D_5$1/2 NS to be infused is 1000 ml over an eight-hour period. The KCl should be added to each solution.

(NOTE: To obtain the 800 ml volume, 200 ml must be removed from the container either by syringe or IV tubing.)

D. The only solution ordered is Plasmalyte 56. The amount of solution to be infused over a twelve-hour period is 1000 ml. The M.V.I. should be added to only one of these bottles each day.

E. The order is for D_5W only, so this is the only solution to be hung. No specific volume is ordered, so any volume can be hung. The infusion time is also unspecified, but the "keep vein open" order indicates that only a small amount should be infused.

PART II

A.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
4-16	D_5W 1000 ml c̄ 20 mEq KCl	This will depend upon	
	D_5LR 1000 ml c̄ 20 mEq KCl	when the first ordered	
	$D_5$1/2 NS 1000 ml	solution is hung	
	Alternate q̄ 8 hr		
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	
116	Arre, Soo U.	45260	

(NOTE: Unless the normal saline has been ordered to be continued, it should be discontinued and the first ordered solution begun.)

ANSWERS TO ASSIGNMENT SHEET

B.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
4-16	D_5W 1000 ml	This will depend	
	D_5W 1000 ml	upon when the first	
	$D_5$1/4 NS	ordered solution is	
	Alternate $\overline{q}$ 8 hr	hung	
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	
222	Carey, I. Will	24630	

C.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
4-16	D_5W 800 ml $\bar{c}$ 20 mEq KCl	2 A.M.	
	$D_5$1/2 NS 1000 ml $\bar{c}$ 20 mEq KCl	10 A.M.	
	D_5W 800 ml $\bar{c}$ 20 mEq KCl	6 P.M.	
	$D_5$1/2 NS 1000 ml $\bar{c}$ 20 mEq KCl	2 A.M. (4-17)	
	Alternate $\overline{q}$ 8 hr		
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	
432	Done, Will B.	44400	

D.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
4-16	Plasmalyte 56	10 A.M. - 10 P.M.	
	1000 ml $\overline{q}$ 12 hr	10 A.M. - 10 P.M.	
		This schedule is an	
		arbitrary time; the	
		actual time would	
		depend upon when	
		the IV was started	
	M.V.I. ampt to one bottle daily	10 A.M.	
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	
713	Doe, Babe B.	73132	

ANSWERS TO ASSIGNMENT SHEET

E.

DATE BEGUN	MEDICATION AND/OR IV FLUID	TIME SCHEDULE	DATE DC'D
4-16	D_5W to KVO	6 A.M.	
ROOM	PATIENT'S NAME	HOSPITAL NUMBER	
Bed 2	Kidder, V.	74801	

ROLES AND RESPONSIBILITIES
UNIT I

TEST

NAME ______________________________ SCORE ________________

1. Match terms associated with roles and responsibilities to their correct definitions. Write the correct numbers in the blanks.

_____a. Something established as a rule or basis of comparison in measuring or judging something else

_____b. Obligation to perform a task in a certain manner

_____c. Governing principle or plan; a plan of action

_____d. Freedom or power to make decisions and choices

_____e. Written communication tool

_____f. Written statement that describes and details work to be performed

_____g. Act, method, or manner of proceeding in an action

_____h. Act of giving or exchanging information by talking, gesturing, or writing

_____i. Written or printed statement testifying to skill or qualification

_____j. Organization having a social, educational, or religious purpose

_____k. To explain the meaning of; to clarify or translate

_____l. Document that outlines laws regulating nursing

1. Procedure
2. Discretion
3. Standard
4. Certification
5. Job description
6. Responsibility
7. Institution
8. Communication
9. Policy
10. Interpret
11. Nurse Practice Act
12. Kardex

TEST

2. Match abbreviations associated with roles and responsibilities to their correct terms. Write the correct numbers in the blanks.

_____a. Lactated Ringer's

_____b. Every

_____c. Ampule

_____d. Potassium chloride

_____e. Multivitamin infusion

_____f. Keep vein open

1. Amp
2. M.V.I
3. KCl
4. $\bar{q}$
5. LR (or RL)
6. KVO (or KO or KOR)

3. Discuss Oklahoma legislation and standards for IV therapy.

a. Oklahoma Nurse Practice Act--______________________________

____

b. Standards that the nurse must follow

1) ____

____

2) ____

____

3) ____

____

4. State rules regarding nursing ethics and patient rights as applied to IV therapy.

a. Nursing ethics

1) ____

2) ____

b. Patient rights

1) ____

2) ____

5. State four points regarding doctors' orders to be considered by the nurse.

a. ____

b. ____

TEST

c. ______________________________

d. ______________________________

6. Select from the following list points to be considered in the interpretation and communication of doctors' orders. Write an "X" in the blank before each correct answer.

______a. Convenient time schedule for the nurses

______b. Whether or not medications to be added to the solution are due at your busy time

______c. Time schedule on which the solutions should be placed (will depend upon specified infusion time and time first infusion was begun)

______d. Amount of time patient wants infusion to run

______e. Whether or not medications are to be added to the solution

______f. Solution(s) ordered

______g. Which solution ordered will be convenient for you to hang first

______h. Where IV orders are to be written for communication to other nurses

______i. Which solution can be obtained first

______j. Volume of solution ordered

______k. How the medication that is to be added should be written on communication tool

______l. Which solution should be infused first, second, third, and so on

______m. How orders should be written on communication tool

______n. Amount of time in which a specified volume of fluid is to infuse

(NOTE: Test question 7 lists the assignment sheet. It is an important part of this test. If it has not been completed, check with your instructor.)

7. Interpret and communicate doctors' orders.

ROLES AND RESPONSIBILITIES
UNIT I

ANSWERS TO TEST

1. a. 3
   b. 6
   c. 9
   d. 2
   e. 12
   f. 5
   g. 1
   h. 8
   i. 4
   j. 7
   k. 10
   l. 11

2. a. 5
   b. 4
   c. 1
   d. 3
   e. 2
   f. 6

3. Discussion should include the following

   a. Oklahoma Nurse Practice Act--Does not prohibit any nurse from starting and/or maintaining IV therapy

   b. Standards that the nurse must follow

      1) Nurse *must* assume responsibility of obtaining and knowing the institution's policies and procedures regarding IV therapy

      2) Institution may require certification or other evidence of specific training

      3) Nurse should obtain and know the job description regarding his or her specific role with IV therapy

4. a. Nursing ethics

      1) Each nurse must be responsible for his or her own actions

      2) Each nurse must be aware of self-limitations and never endanger a patient

   b. Patient rights

      1) Patients have the right to refuse any or all treatment and therapy

      2) Patients have the right to know the reason for therapy and the expected results

ANSWERS TO TEST

5. Answer should include any four of the following

   a. IV therapy can be initiated only by a doctor's order

   b. Orders must be interpreted by nurse and then communicated to proper people as set by policy of the institution

   c. Orders may leave much to the nurse's discretion

   d. Orders must be readable and reasonable; if they are not, the doctor must be contacted for clarification

   e. Orders taken by telephone must be repeated back to the physician

6. c, e, f, h, j, k, l, m, n

7. Evaluated to the satisfaction of the instructor

ANATOMY AND PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND SKIN
UNIT II

UNIT OBJECTIVE

After completing this unit, the student should be able to trace the circulation of the blood from the tissues through the cardiopulmonary system and to interpret the physiology and pathophysiology of these systems. The student should also be able to name characteristics of veins and skin and interpret their involvement in IV therapy. This knowledge will be shown by completing the assignment sheet and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match to their correct definitions terms associated with anatomy and physiology of the circulatory system and skin.
2. Label the parts of the cardiopulmonary system's anatomy.
3. Discuss the physiology of the cardiopulmonary system.
4. Distinguish between pathophysiological conditions of the cardiopulmonary system.
5. Describe anatomy and circulation of the venous system.
6. Describe physiology of the arterial/venous system.
7. Describe pathophysiological conditions of the venous system.
8. Match parts of a vein to their correct descriptions.
9. Describe skin layers.
10. Trace the flow of blood through the heart.

ANATOMY AND PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND SKIN
UNIT II

SUGGESTED ACTIVITIES

I. Suggested activities

   A. Order materials planned to supplement unit.

   B. Pretest students to assess their present knowledge of the subject.

   C. Provide students with objective sheet.

   D. Provide students with information and assignment sheets.

   E. Discuss unit and specific objectives.

   F. Discuss information sheet.

   G. Individualize instruction for students with special needs.

   H. Give test.

   I. Discuss test.

   J. Reteach if necessary.

II. Instructional materials

   A. Objective sheet

   B. Suggested activities

   C. Information sheet

   D. Assignment Sheet #1--Trace the Flow of Blood Through the Heart

   E. Answer to assignment sheet

   F. Test

   G. Answers to test

III. Unit references

   A. Crouch, James E., and J. Robert McClintic. *Human Anatomy and Physiology*, 2nd ed. New York: John Wiley and Sons, 1971.

   B. Emmerson, Charles Phillips, Jr., and Jane Sherburn Bragdon. *Essentials of Medicine*, 17th ed. Philadelphia: J.B. Lippincott Co., 1955.

   C. "Fluid Electrolyte and Renal Problems." Seminar given by Kansas Regional Medical Program, Wichita, Kansas, n.d.

SUGGESTED ACTIVITIES

D. Plumer, Ada L. *Principles and Practices of IV Therapy,* 2nd ed. Boston: Little, Brown and Co., 1975.

E. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary*. Philadelphia: F.A. Davis Co., 1981.

F. Thomas, Virginia. *Life Sciences for Nursing and Health Technologies,* 3rd ed. Long Beach, California: Technicourse, 1977.

IV. Recommended reading

A. Boyd, Jeanette M. Loughrie. "Understanding and Treating Cardiogenic Shock." *RN*, Vol. 38, No. 4, (April 1975), pp. 53-62.

B. Graff, Carol. "Warning, Don't Jump to Conclusions When a Patient's in Shock." *RN*, Vol. 41, No. 8, (August 1978), pp. 23-28.

C. Higgie, Judith. "Pulling Your Patient Through Congestive Heart Failure." *RN*, Vol. 43, No. 9, (September 1980), pp. 30-36.

D. Isacson, Lauren Marie, and Klaus Schultz. "Treating Pulmonary Edema." *Nursing78*, Vol. 8, No. 1, (January 1978), pp. 42-46.

E. Juliani, Louise. "Assessing Renal Function." *Nursing78*, Vol. 8, No. 1, (January 1978), pp. 34-35.

F. Lancour, Jane. "ADH and Aldosterone: How to Recognize Their Effects." *Nursing78*, Vol. 8, No. 9, (September 1978), p. 36.

G. Meador, Billie. "COPD Can End in Heart Failure and What to Do About It." *RN*, Vol. 43, No. 5, (May 1980), pp. 65-72.

H. Wiley, Loy. "Shock, Different Kinds, Different Problems." *Nursing74*, Vol. 4, No. 5, (May 1974), pp. 43-53.

I. Wiley, Loy. "Staying Ahead of Shock." *Nursing74*, Vol. 4, No. 4, (April 1974), pp. 19-27.

ANATOMY AND PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND SKIN
UNIT II

INFORMATION SHEET

I. Terms and definitions

A. Autonomic nervous system--Division of the nervous system that innervates glands as well as smooth and cardiac muscle

B. Compensate--To make up for; counterbalance

C. Contract--To reduce in size, draw together; the drawing up and thickening of a muscle in action

D. Diffusion--Passage of small particles through a semipermeable membrane from a solution of higher concentration to one of lower concentration

E. Dorsum--The back; of, on, or near the back

F. Edema--Abnormal accumulation of fluid in tissues

G. Lumen--Inside opening of a closed vessel

H. Pathophysiology--Disease state that changes the structural or functional state of an organ

I. Peripheral--Lying at the outside or away from the central part

J. Physiology--Functions and vital processes of an organ or organ systems

K. Spasm--Sudden, abnormal, involuntary contraction of a muscle or blood vessel

L. Stasis--Stagnation of normal flow of fluids

M. Superficial--Of, lying near, or forming the surface

N. Tortuous--Consisting of or abounding in irregular bends or turns; twisting

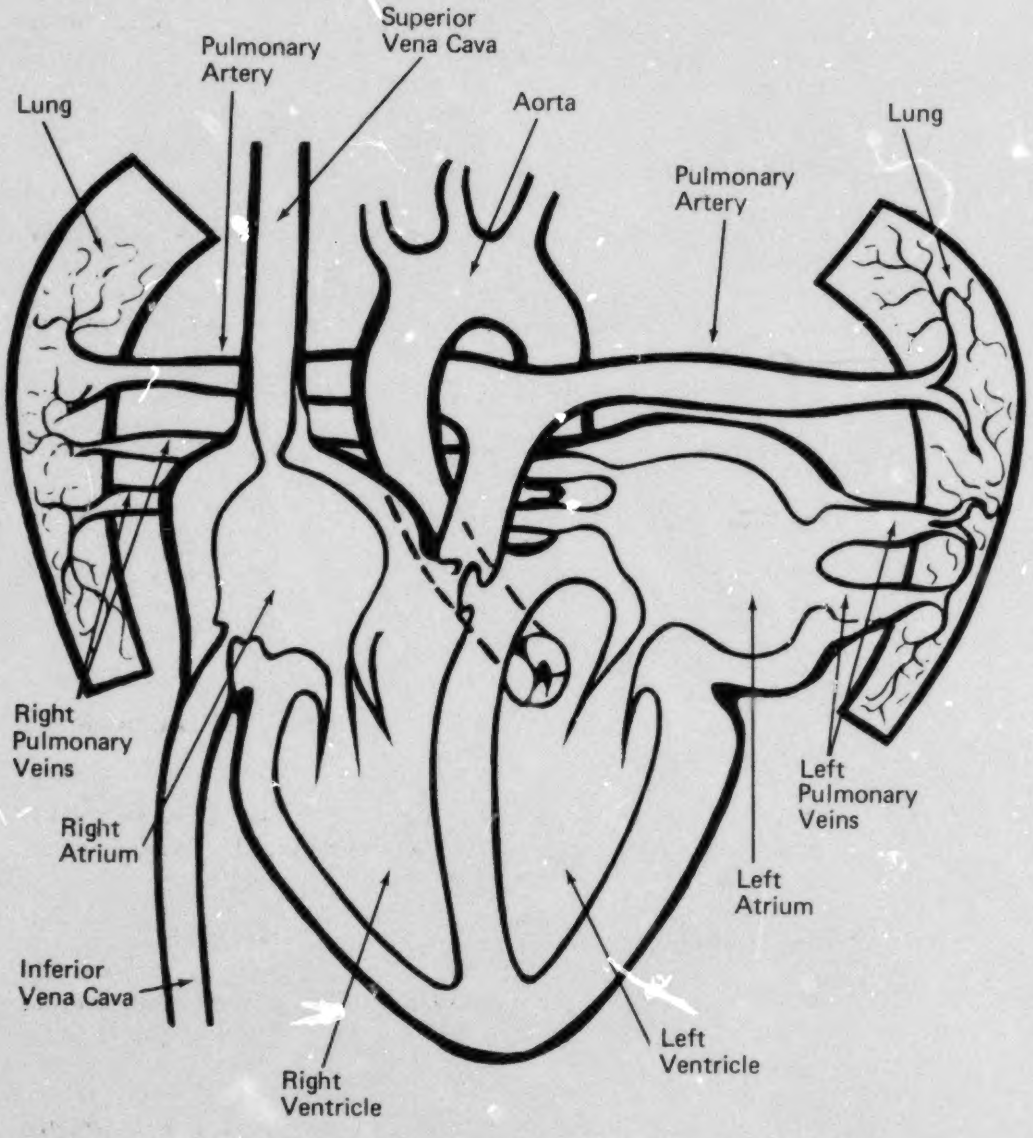
O. Tricuspid--Having three cusps or points

P. Valve--Any contrivance or arrangement that regulates the amount and direction of flow of liquid, gas, vapor, or loose material

INFORMATION SHEET

II. Anatomy of the cardiopulmonary system (Figure 1; Assignment Sheet #1)

FIGURE 1



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INFORMATION SHEET

III. Physiology of the cardiopulmonary system

  A. Heart--Acts as pumping device to move blood throughout body

  B. Lungs--Site where oxygen is combined with hemoglobin to then be carried to cells; help remove waste products such as carbon dioxide

IV. Pathophysiological conditions of cardiopulmonary system

  A. Congestive heart failure (CHF)

    1. Heart fails to act as an effective pump; does not completely empty ventricles

    2. Blood vessels in lungs become congested, impairing respiratory function

    3. Venous pressure is increased, resulting in peripheral edema

    4. Blood vessels in liver become congested, impairing liver function

    5. Blood vessels in kidneys become congested, impairing renal function

    (NOTE: This disease process usually takes place over a period of many months or years.)

  B. Chronic obstructive pulmonary disease (COPD)

    1. Alveolar surface of lungs is reduced; thus, ability of blood to take on oxygen and give up carbon dioxide is reduced

    (NOTE: The alveolar surface of the lungs is the area where the exchange of oxygen and/or carbon dioxide occurs. This disease process usually takes place over many years.)

    2. Heart rate increases as a compensatory mechanism

    (NOTE: The heart rate increases to try to get blood into and out of the lungs faster, and to take on more oxygen and give up more carbon dioxide.)

    3. Reduced gas exchange often leads to irregularities in heart rhythm

    (NOTE: Any heart rhythm other than normal reduces the effectiveness of the heart as a pump.)

    EXAMPLES: Atrial fibrillation, multifocal atrial tachycardia

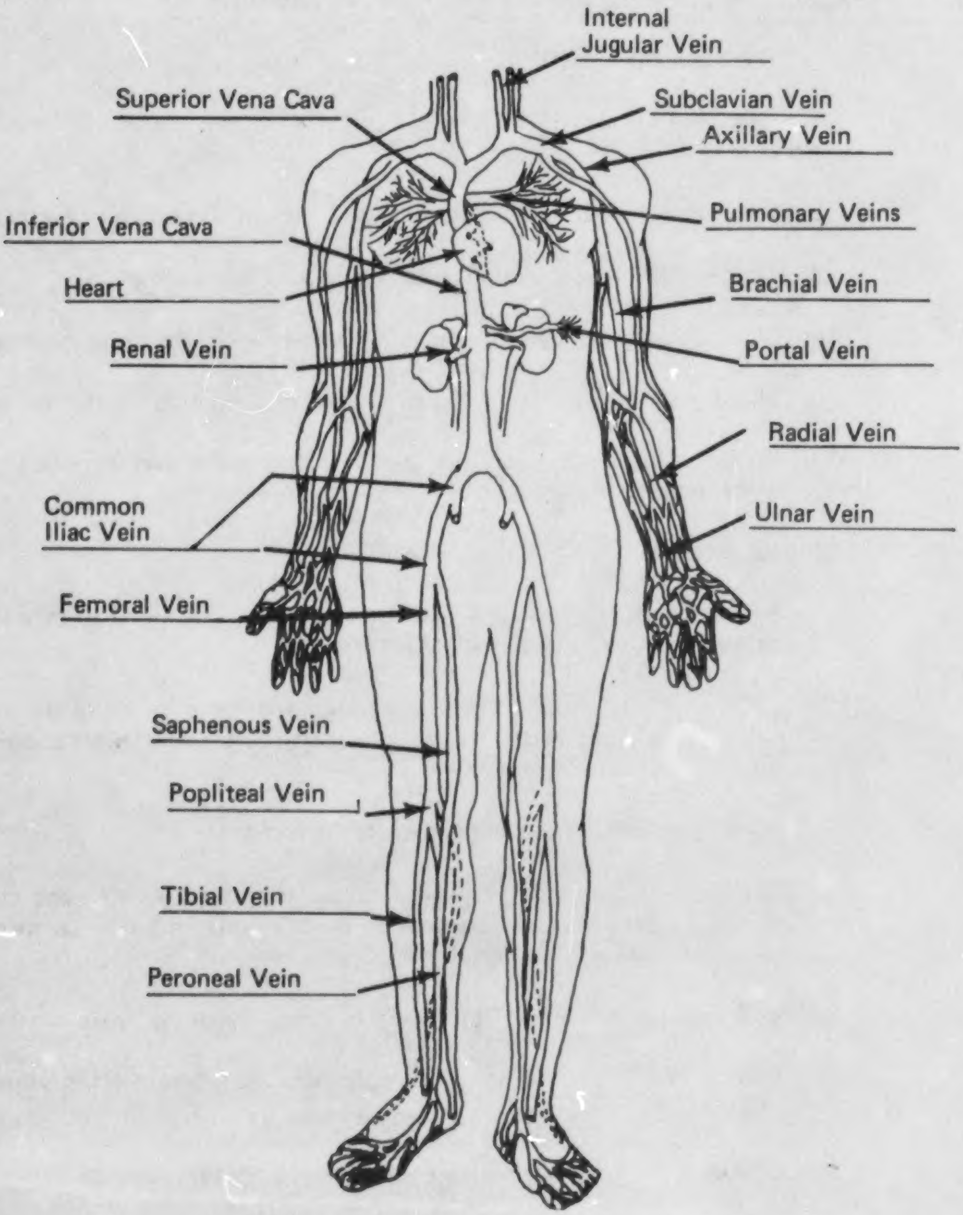
INFORMATION SHEET

V. Anatomy and circulation of the venous system (Figure 2)

A. Venous system is composed of superficial veins and deep veins

EXAMPLE:

FIGURE 2

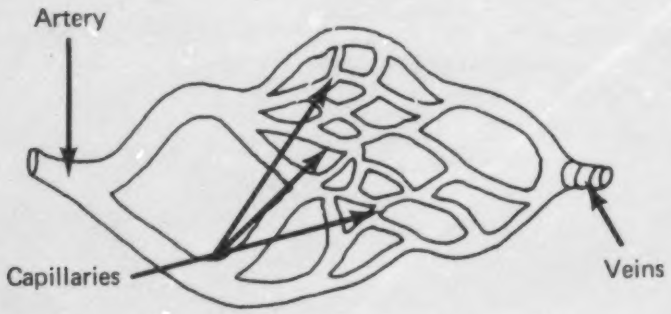


INFORMATION SHEET

B. Blood moves from capillaries in the microvenous circulation to general venous circulation, to the inferior and superior venae cavae, and then into the right atrium (Figure 3)

EXAMPLE:

FIGURE 3



C. Blood is moved from periphery by movement of the muscles

VI. Physiology of the arterial/venous system

A. Nutrients and oxygen pass through arteriocapillary walls by diffusion

B. Waste products pass through venous capillary walls by diffusion

C. The exchange is controlled by the autonomic nervous system

VII. Pathophysiological conditions of the venous system

A. Phlebitis--Inflammation of vein wall

(NOTE: The inflammation may be caused by injury to the vein and stasis of blood in the vein.)

B. Thrombophlebitis--Condition in which a clot is formed within the vein lumen

(NOTE: Thrombophlebitis may occur in conjunction with phlebitis.)

C. Varicosities--Permanently dilated and tortuous veins

(NOTE: Varicosities occur mainly in leg veins.)

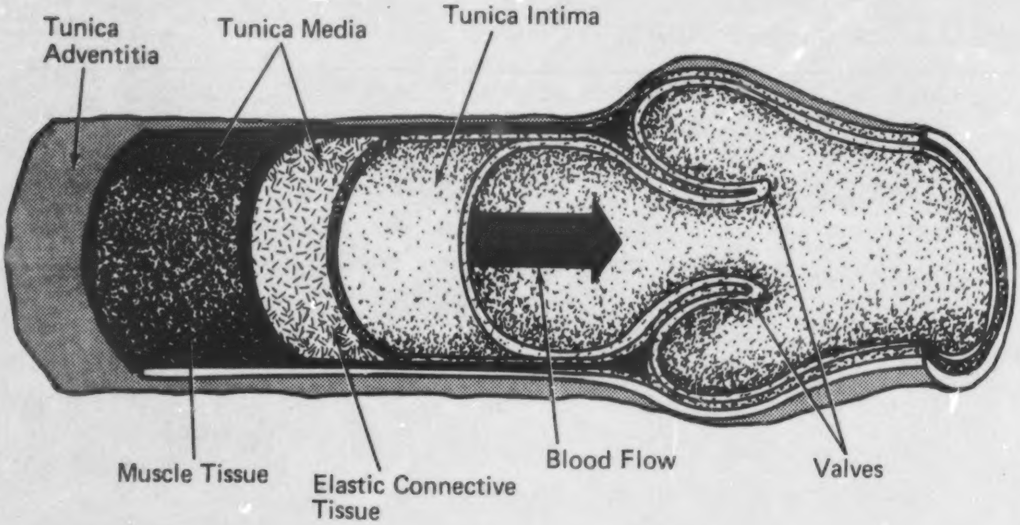
(CAUTION: A varicosed vein must never be used for IV therapy because the blood in such a vein is relatively stagnant. If a medication is injected into a varicosity, the onset of action is delayed and a collection of the drug may occur. If for any reason the circulation in this vein is speeded up, an accidental overdose could occur.)

INFORMATION SHEET

VIII. Description of parts of a vein (Figure 4)

EXAMPLE:

FIGURE 4



A. Walls

1. Are composed of three relatively thin layers
2. Are not as strong or stiff as those of arteries; thus, they distend or collapse easily

   (NOTE: Because vein walls are not strong or stiff, spasms can easily occur.)

B. Valves

1. Consist of folds of the inner layer
2. Are found in larger veins
3. Occur where veins branch, often causing a very noticeable bulge
4. Help keep blood from pooling and/or backing up

   (NOTE: Valves allow the blood to move in one direction only.)

INFORMATION SHEET

IX. Skin layers

- A. Epidermis
    1. Outermost layer
    2. Protective layer
    3. Thickness varies
- B. Dermis
    1. Innermost layer
    2. Sensitive and highly vascular
    3. Contains many capillaries
    4. Contains thousands of nerve fibers

       (NOTE: The number of nerve fibers varies in different areas of the body. Pain felt varies according to the number of nerve fibers and the protective thickness of the epidermis.)

ANATOMY AND PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND SKIN
UNIT II

ASSIGNMENT SHEET #1--TRACE THE FLOW OF BLOOD THROUGH THE HEART

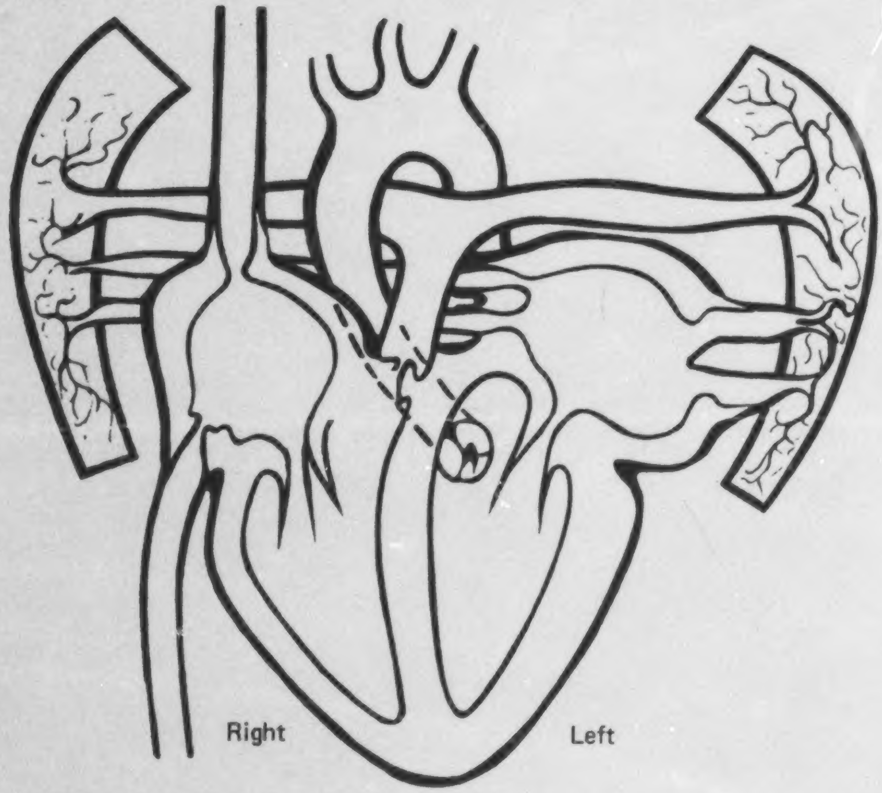
NAME ______________________________ SCORE ______________

Familiarity with the way blood flows in and out of the heart will aid you in understanding congestive heart failure.

Trace the flow of blood through the heart below, starting with the superior vena cava. Indicate oxygenated blood with a double arrow (⇉), and unoxygenated blood with a single arrow (→).

Blood flows through the superior and inferior venae cavae into the right atrium of the heart. It then flows through a tricuspid valve and into the right ventricle. From the right ventricle, it flows through the pulmonary valve, into the pulmonary artery, and into the lungs.

Blood returns to the heart from the lungs by flowing through the pulmonary veins into the left atrium. It flows from the left atrium, through the mitral valve, and into the left ventricle. It is then pumped through the aortic valve, into the aorta, and then flows to the general arterial circulation.



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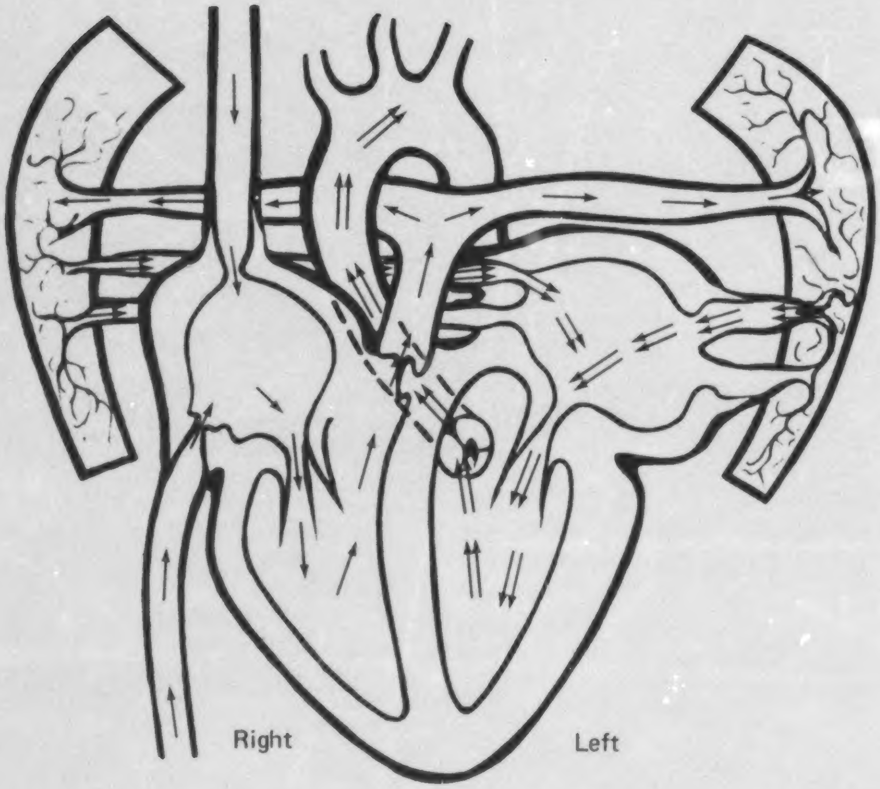
ANATOMY AND PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND SKIN
UNIT II

ANSWER TO ASSIGNMENT SHEET



ANATOMY AND PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND SKIN
UNIT II

TEST

NAME____ SCORE ________________

1. Match to their correct definitions terms associated with anatomy and physiology of the circulatory system and skin. Write the correct numbers in the blanks.

_____a. The back; of, on, or near the back

_____b. Any contrivance or arrangement that regulates the amount and direction of flow of liquid, gas, vapor, or loose material

_____c. Lying at the outside or away from the central part

_____d. To make up for; counterbalance

_____e. Disease state that changes the structural or functional state of an organ

_____f. Division of the nervous system that innervates glands as well as smooth and cardiac muscle

_____g. Stagnation of normal flow of fluids

_____h. Abnormal accumulation of fluid in tissues

_____i. Functions and vital processes of an organ or organ systems

_____j. Sudden, abnormal, involuntary contraction of a muscle or blood vessel

_____k. Of, lying near, or forming the surface

_____l. To reduce in size, draw together; the drawing up and thickening of a muscle in action

_____m. Consisting of or abounding in irregular bends or turns; twisting

_____n. Inside opening of a closed vessel

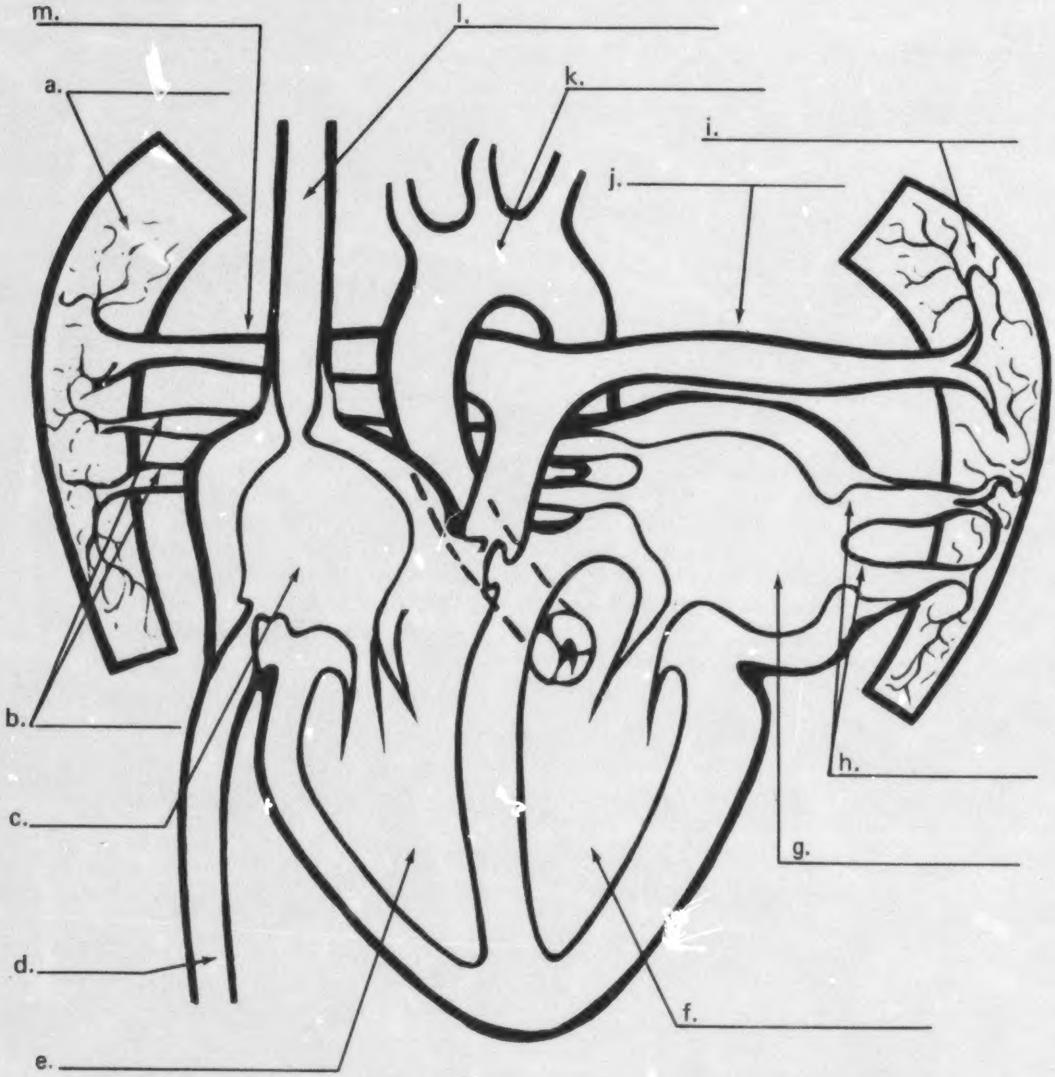
_____o. Having three cusps or points

_____p. Passage of small particles through a semipermeable membrane from a solution of higher concentration to one of lower concentration

1. Tricuspid
2. Valve
3. Physiology
4. Pathophysiology
5. Contract
6. Peripheral
7. Edema
8. Compensate
9. Superficial
10. Diffusion
11. Autonomic nervous system
12. Stasis
13. Lumen
14. Tortuous
15. Spasm
16. Dorsum

TEST

2. Label the parts of the cardiopulmonary system's anatomy. Write the correct anatomical names in the blanks.



TEST

3. Discuss the physiology of the cardiopulmonary system.

   a. Heart--______________________________

   ____

   b. Lungs--______________________________

   ____

4. Distinguish between pathophysiological conditions of the cardiopulmonary system. Write "CHF" for characteristics of congestive heart failure, and "COPD" for characteristics of chronic obstructive pulmonary disease.

   _____a. Blood vessels in kidneys become congested, impairing renal function

   _____b. Blood vessels in lungs become congested, impairing respiratory function

   _____c. Heart fails to act as an effective pump; does not completely empty ventricles

   _____d. Heart rate increases as a compensatory mechanism

   _____e. Reduced gas exchange often leads to irregularities in heart rhythm

   _____f. Blood vessels in liver become congested, impairing liver function

   _____g. Alveolar surface of lungs is reduced; thus, ability of blood to take on oxygen and give up carbon dioxide is reduced

   _____h. Venous pressure is increased, resulting in peripheral edema

5. Describe anatomy and circulation of the venous system.

   ____

   ____

   ____

   ____

6. Describe physiology of the arterial/venous system.

   ____

   ____

   ____

TEST

7. Describe pathophysiological conditions of the venous system.

   a. Phlebitis-- ____

   ____

   b. Thrombophlebitis-- ____

   ____

   c. Varicosities-- ____

   ____

8. Match parts of a vein to their correct descriptions. Write the correct numbers in the blanks. Numbers may be used more than once.

   _____a. Occur where veins branch, often causing a very noticeable bulge

   _____b. Are not as strong or stiff as those of arteries; thus, they distend or collapse easily

   _____c. Help keep blood from pooling and/or backing up

   _____d. Consist of folds of the inner layer

   _____e. Are composed of three relatively thin layers

   _____f. Are found in larger veins

   1. Walls

   2. Valves

9. Describe skin layers.

   a. Epidermis--____

   ____

   ____

   b. Dermis--____

   ____

   ____

(NOTE: Test question 10 lists the assignment sheet. It is an important part of this test. If it has not been completed, check with your instructor.)

10. Trace the flow of blood through the heart.

ANATOMY AND PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND SKIN
UNIT II

ANSWERS TO TEST

1. a. 16
   b. 2
   c. 6
   d. 8
   e. 4
   f. 11
   g. 12
   h. 7
   i. 3
   j. 15
   k. 9
   l. 5
   m. 14
   n. 13
   o. 1
   p. 10

2. a. Lung
   b. Right pulmonary veins
   c. Right atrium
   d. Inferior vena cava
   e. Right ventricle
   f. Left ventricle
   g. Left atrium
   h. Left pulmonary veins
   i. Lung
   j. Pulmonary artery
   k. Aorta
   l. Superior vena cava
   m. Pulmonary artery

3. Discussion should include the following
   a. Heart--Acts as pumping device to move blood throughout body
   b. Lungs--Site where oxygen is combined with hemoglobin to then be carried to cells; help remove waste products such as carbon dioxide

ANSWERS TO TEST

4. a. CHF
   b. CHF
   c. CHF
   d. COPD
   e. COPD
   f. CHF
   g. COPD
   h. CHF

5. Description should include the following
   a. Venous system is composed of superficial veins and deep veins
   b. Blood moves from capillaries in the microvenous circulation to general venous circulation, to the inferior and superior venae cavae, and then into the right atrium
   c. Blood is moved from periphery by movement of the muscles

6. Description should include the following
   a. Nutrients and oxygen pass through arteriocapillary walls by diffusion
   b. Waste products pass through venous capillary walls by diffusion
   c. The exchange is controlled by the autonomic nervous system

7. Description should include the following
   a. Phlebitis--Inflammation of vein wall
   b. Thrombophlebitis--Condition in which a clot is formed within the vein lumen
   c. Varicosities--Permanently dilated and tortuous veins

8. a. 2
   b. 1
   c. 2
   d. 2
   e. 1
   f. 2

9. Description should include the following
   a. Epidermis
      1) Outermost layer
      2) Protective layer
      3) Thickness varies

ANSWERS TO TEST

b. Dermis

  1) Innermost layer

  2) Sensitive and highly vascular

  3) Contains many capillaries

  4) Contains thousands of nerve fibers

10. Evaluated to the satisfaction of the instructor

CONSIDERATIONS FOR IV THERAPY
UNIT III

UNIT OBJECTIVE

After completing this unit, the student should be able to apply principles related to normal hydration, dehydration, and fluid overload in the practice of appropriate IV therapy. This knowledge will be shown by completing assignment sheet and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with IV therapy to their correct definitions.
2. State reasons for use of IV therapy.
3. Discuss hydration and normal fluid balance.
4. Describe regulatory factors that maintain fluid balance.
5. Select from a list disturbances in regulatory factors that maintain fluid balance.
6. State nursing responsibilities and interventions with regard to regulatory factors in fluid balance.
7. Match to their correct definitions terms associated with dehydration and fluid overload.
8. Discuss dehydration as a fluid imbalance.
9. List signs of dehydration.
10. State nursing responsibilities and interventions with regard to possible dehydration.
11. Discuss causes of fluid overload as a fluid imbalance.
12. List signs of fluid overload.
13. Select from a list nursing responsibilities and interventions with regard to suspected fluid overload.
14. Match normal laboratory values to their correct laboratory tests.
15. Recognize problems with fluid balance.

CONSIDERATIONS FOR IV THERAPY
UNIT III

SUGGESTED ACTIVITIES

I. Suggested activities

  A. Give pretest.

  B. Provide students with objective sheet.

  C. Provide students with information and assignment sheets.

  D. Discuss unit and specific objectives.

  E. Discuss information sheet.

  F. Individualize instruction for students with special needs.

  G. Use personal experiences pertinent to individual topics.

  H. Discuss assignment sheet.

  I. Give test.

  J. Discuss test.

  K. Reteach if necessary.

II. Instructional materials

  A. Objective sheet

  B. Suggested activities

  C. Information sheet

  D. Assignment Sheet #1 — Recognize Problems with Fluid Balance

  E. Answers to assignment sheet

  F. Test

  G. Answers to test

III. Unit references

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D. Summer, Sara M., and Pamela A. Grau. "To Detect Hypovolemia Shock, Anticipate and Act Swiftly." *Nursing81,* Vol. 11, No. 10, (October 1981),pp. 46 and 51.

E. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary.* 14th ed. Philadelphia: F. A. Davis Co., 1981

IV. Recommended additional reading

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C. Stark, June L. "BUN/Creatinine: Your Keys to Kidney Function." *Nursing80,* Vol. 10, No. 5, (May 1980), pp. 33-38.

D. Steele, Bonnie. "Giving Your Patient Meticulous Mouth Care." *Nursing80,* Vol. 10, No. 3, (March 1980), pp. 70-75.

E. Twombly, Marilyn. "The Shift into Third Spaces." *Nursing78,* Vol. 8, No. 6, (June 1978), pp. 38-41.

F. Urrows, Susan. "Fluid, Electrolyte and Acid-Base Balance." *Nursing Clinics of North America,* (September 1980).

CONSIDERATIONS FOR IV THERAPY
UNIT III

INFORMATION SHEET

I. Terms and definitions

A. Balance — State of equality or equilibrium

B. Compartment — Any of the divisions into which a space is partitioned

C. Congestive heart failure (CHF) — Condition in which the heart fails to pump effectively; results in congestion of venous and/or pulmonary circulation

D. Conscious — Having feeling or knowledge; aware

E. Document — Anything written to record or prove something

F. Electrolyte — Dissolved substance that can carry an electrical charge

EXAMPLES: K+, Na+, Cl-

G. Excrete — To separate from the blood or tissue and eliminate from the body

H. Extracellular — Outside the cells

I. Hemodynamic — Forces involved in the circulation of blood through the body

J. Hydration — State of being combined with water

K. Intervention — Act of coming between

L. Intracellular — Inside the cells

M. Lethargy — Great lack of energy

N. Metabolism — Sum of all physical and chemical changes that take place within the body

O. Nil-per-os (NPO) — Nothing by mouth

P. Osmosis — Tendency of fluids to pass through a semipermeable membrane to equalize concentrations on both sides of the membrane

(NOTE: Movement is from low concentrations to high concentrations.)

Q. Sensation — A feeling or awareness of conditions within or without the body, resulting from the stimulation of sensory receptors

INFORMATION SHEET

II. Reasons for use of IV therapy

- A. Replacing lost body fluids

  (NOTE: Fluids may be lost through vomiting, diarrhea, or hemorrhage; through excessive production of urine, perspiration, saliva, or sputum; or through excessive loss of fluids into a body cavity.)

- B. Providing necessary fluids during a period of NPO

  (NOTE: A period of NPO follows surgery and occurs whenever the gastrointestinal tract must not be stimulated, such as with acute pancreatitis.)

- C. Replacing lost blood

  (NOTE: Blood may be lost through hemorrhage, surgery, or trauma.)

- D. Administering blood products

  EXAMPLES: Plasma, platelets, white blood cells

- E. Providing a route for giving medications
- F. Maintaining or correcting electrolyte and/or acid-base balance/imbalance
- G. Providing patient's nutritional needs
- H. Providing a route for chemotherapy
- I. Monitoring a patient's hemodynamic status

  EXAMPLES: Central venous pressure (CVP) and Swan-Ganz

III. Hydration and normal fluid balance

- A. Hydration (body water)
  1. Body water plays a role in almost all chemical reactions of body

     EXAMPLES:
     1. Digestion
     2. Metabolism
     3. Transportation of nutrients and waste products
     4. Maintenance of internal environment of cells
     5. Regulation of body temperature

  2. Volume differs in relation to age

     EXAMPLES:
     Infant — 75 percent of body weight in water
     Adult — 60 percent of body weight in water
     Older adult — 50 percent of body weight in water

INFORMATION SHEET

3. Compartments of body water are divided into two classifications: intracellular and extracellular

4. Water moves freely by osmosis across cell membrane

B. Normal fluid balance

1. Total volume of body water must be in balance

EXAMPLE: Sixty percent of an adult's body weight should be water.

2. Total volume of body water must be in proper proportion between intracellular and extracellular compartments

EXAMPLE: Fifteen percent of body water is extracellular; 45 percent of body water is intracellular.

IV. Regulatory factors that maintain fluid balance

A. Thirst, a conscious sensation, is regulated by the hypothalamus

(NOTE: The feeling of thirst is activated by an increase in sodium in relation to water in the blood and cells. This increase signals the hypothalamus.)

B. Kidneys reabsorb water when a hormone is released by the pituitary gland

(NOTE: The hormone secreted by the pituitary gland is antidiuretic hormone [ADH].)

C. Kidneys excrete excess water when the volume of fluid passing through them increases

V. Disturbances in regulatory factors that maintain fluid balance

A. Conditions that change the mental functioning of the patient, so that patient does not experience thirst

EXAMPLES: Semiconscious or unconscious states, confusion, tranquilization, depression

B. Conditions that affect the patient's physical ability to eat and drink, making patient unable to respond to thirst

EXAMPLES: Stroke, spinal-cord injury

INFORMATION SHEET

C. Medications that affect the patient's appetite, making patient unwilling to respond to thirst

EXAMPLE: Many heart medications

D. Conditions that cause an equal loss of sodium and water, so that thirst is not experienced

EXAMPLES: Hemorrhage, vomiting, use of some diuretics

E. Conditions that cause the loss of large amounts of fluids that are difficult to replace orally

EXAMPLES: Excessive sputum, excessive sweating, diarrhea, burns

F. Conditions that prevent the patient from taking sufficient fluids

EXAMPLE: Multiple in-hospital diagnostic tests with frequent periods of NPO

G. Conditions in which there is actual organ failure

EXAMPLES: Congestive heart failure, renal failure, hypothalamus or pituitary tumor, liver failure

VI. Nursing responsibilities and interventions with regard to regulatory factors in fluid balance

A. Observe for decreased mental functioning and make sure that these patients are offered frequent fluids

(NOTE: If the patient cannot take fluids orally, obtain an order for some other type of fluid replacement.)

EXAMPLES: Placement of nasogastric tube with feedings and fluid, IV therapy

B. Assist the physically impaired by offering frequent fluids

C. Give frequent oral care

D. Provide a variety of fluids

E. Initiate a nursing intake and output record (I & O) to maintain a careful watch on fluid balance

F. Obtain an order for a daily weight if indicated

G. Maintain close watch on patients having multiple diagnostic tests; make sure that their fluid requirements are met between the tests

INFORMATION SHEET

- H. Observe closely the hemodynamic status of patients with organ failure; report any changes to the appropriate superior
- I. Carefully document, on the appropriate chart forms, all observations, assessments, and actions

VII. Terms and definitions associated with dehydration and fluid overload

- A. Carbon dioxide (CO_2) — Colorless gas produced as a waste product of metabolism
- B. Conjunctiva — Mucous membrane that lines the inner surface of the eyelid
- C. Deficit — Inadequate amount
- D. Dyspnea — Difficult or labored breathing
- E. Edema — Abnormal accumulation of fluid in tissues or cavities of the body, with resultant swelling
- F. Hypotonic — Solution having osmotic pressure less than that of another solution taken as a standard
- G. Imbalance — State of inequality; not equal
- H. Isotonic — Solution having the same osmotic pressure as another solution taken as a standard

  (NOTE: An isotonic solution is one that has a concentration of electrolytes, nonelectrolytes, or a combination of the two that will exert an osmotic pressure equal to that of a comparative solution.)

  EXAMPLE: A solution of 0.9% salt in water is isotonic to blood

- I. Mucosa — Mucus-secreting membrane that lines body cavities and canals such as the mouth
- J. Rale — Abnormal breath sound heard when listening to the chest

  (NOTE: The sound is produced by passage of air through bronchi that contain secretions or exudate, or bronchi that are constricted by spasm or a thickening of their walls.)

- K. Turgor — Normal fullness of the capillaries and blood vessels

INFORMATION SHEET

VIII. Dehydration as a fluid imbalance

- A. Occurs when more body fluid is lost than is replaced

  (NOTE: The loss of 1 liter [approximately 1 quart] of body water not replaced is equal to 1 kilogram [2.2 pounds.])

- B. Occurs more rapidly if large amounts of body fluids are lost at one time

  EXAMPLE: Child with vomiting, diarrhea, and a temperature

- C. Creates highest risk for the elderly and infants

  (NOTE: Risk is high because so little of the body weight of an older adult or so much of the body weight of an infant is fluid that even a small loss can endanger them.)

IX. Signs of dehydration

- A. Early signs
  1. Dryness of lips, conjunctiva, or mucosa
  2. Decrease in urine output to less than 500 milliliters in twenty-four hours
  3. Sunken eyeballs
  4. Dry skin with poor turgor

     (CAUTION: This sign is not always reliable because many elderly people have dry, loose skin when in a normal state of hydration.)

- B. Later signs

  (NOTE: These signs indicate a more severe fluid deficit.)

  1. Temperature elevation without presence of infection
  2. Hypotension

     (NOTE: If a surgical patient's blood pressure is normotensive when the patient is lying on his or her back and then drops when the patient is turned to the side, this is almost always diagnostic of a low circulating [intravascular] fluid volume.)

  3. Weight loss of more than 1 pound per day

     (NOTE: Body weight is an important indicator of fluid balance.)

  4. Shrunken, furrowed tongue

INFORMATION SHEET

C. Laboratory value changes

1. Abnormally elevated hemoglobin (Hgb) and hematocrit (Hct)

2. Urine specific gravity increased above 1.030

3. Serum sodium (Na) increased above 145

4. Elevated blood urea nitrogen (BUN) with normal creatinine

(NOTE: This laboratory value indicates a more severe fluid deficit.)

X. Nursing responsibilities and interventions with regard to possible dehydration (Assignment Sheet #1)

A. Obtain a nursing history to ascertain possibility of dehydration

B. Observe for signs of dehydration

C. Maintain accurate I & O record for patients who may be at high risk

D. Watch laboratory-report values; report if abnormal

E. Obtain order for appropriate laboratory tests if none are ordered

F. Maintain correct flow rate if patient is on IV therapy

(CAUTION: Never set an IV flow rate for nurse's convenience. The IV is ordered for a specific purpose and must be properly infused.)

G. Document carefully, on appropriate chart forms, all observations, assessments, and actions

XI. Causes of fluid overload as a fluid imbalance

(NOTE: Occurrence can be due to more fluid being taken in or retained by the body than is excreted.)

A. Failure of an organ or organ system

EXAMPLES: Congestive heart failure, renal failure, chronic obstructive pulmonary disease

INFORMATION SHEET

B. Improper administration of IV fluids

(NOTE: The possibility of overload, when too large an amount is infused too quickly, is greatly increased when a health problem exists, such as cardiovascular or renal disease.)

EXAMPLES: Nurse error of infusing too much, too quickly
Physician error

1. Ordering too much fluid too rapidly for patient's general condition

2. Ordering only hypotonic solutions (D_5W or $D_5\frac{1}{2}$ NS)

   (NOTE: These hypotonic solutions dilute the concentration of sodium in the serum and can result in an isotonic expansion of the circulating volume.)

XII. Signs of fluid overload

A. Unexplained increase in respiratory rate

B. Dry, hacky cough

C. Increased and/or bounding pulse

D. Dyspnea

E. Restlessness and/or disorientation

F. Rales

G. Neck-vein distention

(NOTE: When checking for neck-vein distention, elevate the head of the bed at least 30 degrees to 45 degrees.)

H. Irregular pulse

I. Dependent edema

(NOTE: Dependent edema may occur in ankles and feet, but if the patient is on bed rest, it may be noticed first in the sacral area.)

XIII. Nursing responsibilities and interventions with regard to suspected fluid overload (Assignment Sheet #1)

A. Obtain nursing history with reference to any underlying health problems

(NOTE: This history must include information about cardiovascular, pulmonary, or renal disease.)

INFORMATION SHEET

B. Observe high-risk patients closely for signs of fluid overload whenever they are receiving IV therapy

(NOTE: High-risk patients include those with cardiovascular, pulmonary, or renal disease.)

C. Maintain accurate I & O on all patients receiving IV therapy

D. Report any consistent excess of fluid intake

E. Maintain accurate and consistent flow rate of IV therapy

F. Document carefully, on appropriate chart forms, all observations, assessments, and actions

XIV. Normal laboratory values

A. Hemoglobin (Hgb) — Male, 14 to 18; female, 12 to 16

B. Hematocrit (Hct) — Male, 42 percent to 52 percent; female, 37 percent to 47 percent

C. Sodium (Na) — 135 to 145

D. Potassium (K) — 3.5 to 5.0

E. Chloride (Cl) — 99 to 103

F. Carbon dioxide (CO_2) — 22 to 34

G. BUN — 7 to 22

H. Creatinine — 0.4 to 1.5

I. Urine specific gravity — 1.002 to 1.030

CONSIDERATIONS FOR IV THERAPY
UNIT III

ASSIGNMENT SHEET #1 — RECOGNIZE PROBLEMS WITH FLUID BALANCE

NAME ______________________________ SCORE ______________

This assignment sheet is designed to help you, the nurse, recognize problems in fluid balance before they become severe. Read the following case studies, and then complete the sections that follow.

PART I

Mrs. U.R. Stable is a seventy-six-year-old woman who was admitted to your unit five days ago for multiple diagnostic tests. She has had full gastrointestinal, urinary tract, and gallbladder X-rays. She has had a cystoscopy, brain and abdominal scans, and numerous gastric tests. You assume her care at 3 P.M. Upon examination of the patient, you observe that she has difficulty talking to you due to a severely dry mouth. She states, "I just don't feel good." You notice that her laboratory values of yesterday show these results: Hgb, 14.8; hct, 50 percent; serum sodium, 146; BUN, 25; creatinine, 0.8.

A. Select the correct nursing diagnosis from the following list. Write an "X" in the blank before the correct answer.

_____1. Fluid volume overload

_____2. Digestion, impairment of

_____3. Nutritional alteration

_____4. Fluid volume deficit

B. State the nursing interventions you would perform. ______________________

____

____

____

____

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____

ASSIGNMENT SHEET #1

PART II

On the eighth day of Mrs. Stable's hospital stay, she went to surgery for a total colectomy. It is now the fourth postoperative day. She has been receiving IV fluid replacement at 125 milliliters an hour. She has a nasogastric tube and Foley catheter in place. You assume her care at 11 P.M. Upon entering the room, you find Mrs. Stable starting to climb out of bed saying, "I've got to get those cookies baked." You have her lie back down, and you obtain vital signs. Her pulse is 120, blood pressure 130/82, and respirations 30. You auscultate the chest and hear rales in both bases.

A. Select the correct nursing diagnosis from the following list. Write an "X" in the blank before the correct answer.

_____1. Urinary elimination, impairment of

_____2. Thought process, impaired

_____3. Respiratory dysfunction

_____4. Fluid volume, excess

B. State the nursing interventions you would perform. ______________________________

____

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____

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____

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____

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____

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____

____

CONSIDERATIONS FOR IV THERAPY
UNIT III

ANSWERS TO ASSIGNMENT SHEET

PART I

A. 4

B. 1. Explain need for fluids to patient and enlist her help.

2. Immediately begin fluid replacement with oral fluids if possible.

3. Alert auxiliary personnel to the need for fluid replacement for this patient.

4. Obtain body weight.

5. If patient is unable to cooperate with oral fluid replacement, notify physician of laboratory values and your observations.

6. Begin monitoring intake and output; enlist patient's cooperation

PART II

A. 4

B. 1. Obtain help from another nurse to ensure that Mrs. Stable will stay in bed.

2. Make sure IV fluids are on time and not ahead.

3. Slow rate to keep vein open (KVO).

4. Note continuing intake and output over period since surgery.

5. Notify physician of your assessments and observations.

6. Prepare to carry out order regarding fluid overload.

CONSIDERATIONS FOR IV THERAPY
UNIT III

TEST

NAME ________________________________ SCORE ______________

1. Match terms associated with IV therapy to their correct definitions. Write the correct numbers in the blanks.

_____a. Any of the divisions into which a space is partitioned

_____b. Having feeling or knowledge; aware

_____c. Nothing by mouth

_____d. Act of coming between

_____e. Inside the cells

_____f. To separate from the blood or tissue and eliminate from the body

_____g. State of equality or equilibrium

_____h. Dissolved substance that can carry an electrical charge

_____i. Tendency of fluids to pass through a semi-permeable membrane to equalize concentrations on both sides of the membrane

_____j. Condition in which the heart fails to pump effectively; results in congestion of venous and/or pulmonary circulation

_____k. Anything written to record or prove something

_____l. Outside the cells

_____m. Forces involved in the circulation of blood through the body

_____n. Great lack of energy

_____o. A feeling or awareness of conditions within or without the body, resulting from the stimulation of sensory receptors

1. Nil-per-os (NPO)
2. Electrolyte
3. Hemodynamic
4. Hydration
5. Metabolism
6. Compartment
7. Intracellular
8. Extracellular
9. Osmosis
10. Balance
11. Conscious
12. Sensation
13. Excrete
14. Congestive heart failure (CHF)
15. Document
16. Intervention
17. Lethargy

TEST

_____p. State of being combined with water

_____q. Sum of all physical and chemical changes that take place within the body

2. State reasons for use of IV therapy.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

3. Discuss hydration and normal fluid balance.

a. Hydration (body water) — ____________________

b. Normal fluid balance — ____________________

TEST

4. Describe regulatory factors that maintain fluid balance.

a. ____

____

b. ____

____

c. ____

____

5. Select from the following list disturbances in regulatory factors that maintain fluid balance. Write an "X" in the blank before each correct answer.

_____a. Conditions that cause increased anxiety

_____b. Medications that affect the patient's appetite, making patient unwilling to respond to thirst

_____c. Conditions that require the patient to drink large quantities of water

_____d. Conditions that cause the loss of large amounts of fluids that are difficult to replace orally

_____e. Conditions that change the mental functioning of the patient, so that patient does not experience thirst

_____f. Conditions that increase the patient's appetite

_____g. Conditions in which there is actual organ failure

_____h. Conditions that affect the patient's physical ability to eat and drink, making patient unable to respond to thirst

_____i. Conditions that cause an equal loss of sodium and water, so that thirst is not experienced

_____j. Conditions that prevent the patient from taking sufficient fluids

_____k. Conditions in which there is increased loss of sleep

TEST

6. State nursing responsibilities and interventions with regard to regulatory factors in fluid balance.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

h. ______________________________

i. ______________________________

7. Match to their correct definitions terms associated with dehydration and fluid overload. Write the correct numbers in the blanks.

______a. Abnormal accumulation of fluid in tissues or cavities of the body, with resultant swelling

______b. Mucus-secreting membrane that lines body cavities and canals such as the mouth

______c. Normal fullness of the capillaries and blood vessels

______d. State of inequality; not equal

______e. Colorless gas produced as a waste product of metabolism

______f. Inadequate amount

______g. Abnormal breath sound heard when listening to the chest

______h. Solution having the same osmotic pressure as another solution taken as a standard

______i. Solution having osmotic pressure less than that of another solution taken as a standard

______j. Mucous membrane that lines the inner surface of the eyelid

______k. Difficult or labored breathing

1. Imbalance
2. Conjunctiva
3. Mucosa
4. Turgor
5. Deficit
6. Isotonic
7. Hypotonic
8. Dyspnea
9. Rale
10. Carbon dioxide (CO_2)
11. Edema

TEST

8. Discuss dehydration as a fluid imbalance.

   a. ______________________

   b. ______________________

   c. ______________________

9. List signs of dehydration.

   a. Early signs

      1) ______________________

      2) ______________________

      3) ______________________

      4) ______________________

   b. Later signs

      1) ______________________

      2) ______________________

      3) ______________________

      4) ______________________

   c. Laboratory value changes

      1) ______________________

      2) ______________________

      3) ______________________

      4) ______________________

10. State nursing responsibilities and interventions with regard to possible dehydration.

    a. ______________________

    b. ______________________

    c. ______________________

    d. ______________________

    e. ______________________

    f. ______________________

    g. ______________________

TEST

11. Discuss causes of fluid overload as a fluid imbalance.

a. ______________________________

____

b. ______________________________

____

12. List signs of fluid overload.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

h. ______________________________

i. ______________________________

13. Select from the following list nursing responsibilities and interventions with regard to suspected fluid overload. Write an "X" in the blank before each correct answer.

_____a. Encourage oral fluids

_____b. Report any consistent excess of fluid intake

_____c. Obtain nursing history with reference to any underlying health problems

_____d. Infuse IV fluids at a rate of at least 150 milliliters per hour

_____e. Observe for decrease in respirations and pulse rate

_____f. Maintain accurate I & O on all patients receiving IV therapy

_____g. Document carefully, on appropriate chart forms, all observations, assessments, and actions

_____h. Observe high-risk patients closely for signs of fluid overload whenever they are receiving IV therapy

_____i. Restrict patient to bed rest with head of bed flat

_____j. Maintain accurate and consistent flow rate of IV therapy

TEST

14. **Match normal laboratory values to their correct laboratory tests. Write the correct numbers in the blanks.**

_____a. Male, 14 to 18; female, 12 to 16

_____b. 0.4 to 1.5

_____c. 99 to 103

_____d. 1.002 to 1.030

_____e. Male, 42 percent to 52 percent; female, 37 percent to 47 percent

_____f. 135 to 145

_____g. 7 to 22

_____h. 22 to 34

_____i. 3.5 to 5.0

1. Hemoglobin (Hgb)
2. Hematocrit (Hct)
3. Sodium (Na)
4. Potassium (K)
5. Chloride (Cl)
6. Carbon dioxide (CO_2)
7. BUN
8. Creatinine
9. Urine specific gravity

(NOTE: Test question 15 lists the assignment sheet. It is an important part of this test. If it has not been completed, check with your instructor.)

15. **Recognize problems with fluid balance.**

CONSIDERATIONS FOR IV THERAPY
UNIT III

ANSWERS TO TEST

1. a. 6
   b. 11
   c. 1
   d. 16
   e. 7
   f. 13
   g. 10
   h. 2
   i. 9
   j. 14
   k. 15
   l. 8
   m. 3
   n. 17
   o. 12
   p. 4
   q. 5

2. a. Replacing lost body fluids
   b. Providing necessary fluids during a period of NPO
   c. Replacing lost blood
   d. Administering blood products
   e. Providing a route for giving medications
   f. Maintaining or correcting electrolyte and/or acid-base balance/imbalance
   g. Providing patient's nutritional needs
   h. Providing a route for chemotherapy
   i. Monitoring a patient's hemodynamic status

3. Discussion should include the following
   a. Hydration (body water)
      1) Body water plays a role in almost all chemical reactions of body
      2) Volume differs in relation to age

ANSWERS TO TEST

    3) Compartments of body water are divided into two classifications: intracellular and extracellular

    4) Water moves freely by osmosis across cell membrane

  b. Normal fluid balance

    1) Total volume of body water must be in balance

    2) Total volume of body water must be in proper proportion between intracellular and extracellular compartments

4. Description should include the following

   a. Thirst, a conscious sensation, is regulated by the hypothalamus

   b. Kidneys reabsorb water when a hormone is released by the pituitary gland

   c. Kidneys excrete excess water when the volume of fluid passing through them increases

5. b, d, e, g, h, i, j

6. a. Observe for decreased mental functioning and make sure that these patients are offered frequent fluids

   b. Assist the physically impaired by offering frequent fluids

   c. Give frequent oral care

   d. Provide a variety of fluids

   e. Initiate a nursing intake and output record (I & O) to maintain a careful watch on fluid balance

   f. Obtain an order for a daily weight if indicated

   g. Maintain close watch on patients having multiple diagnostic tests; make sure that their fluid requirements are met between the tests

   h. Observe closely the hemodynamic status of patients with organ failure; report any changes to the appropriate superior

   i. Carefully document, on the appropriate chart forms, all observations, assessments, and actions

ANSWERS TO TEST

7. a. 11
   b. 3
   c. 4
   d. 1
   e. 10
   f. 5
   g. 9
   h. 6
   i. 7
   j. 2
   k. 8

8. Discussion should include the following
   a. Occurs when more body fluid is lost than is replaced
   b. Occurs more rapidly if large amounts of body fluids are lost at one time
   c. Creates highest risk for the elderly and infants

9. a. Early signs
      1) Dryness of lips, conjunctiva, or mucosa
      2) Decrease in urine output to less than 500 milliliters in twenty-four hours
      3) Sunken eyeballs
      4) Dry skin with poor turgor
   b. Later signs
      1) Temperature elevation without presence of infection
      2) Hypotension
      3) Weight loss of more than 1 pound per day
      4) Shrunken, furrowed tongue
   c. Laboratory value changes
      1) Abnormally elevated hemoglobin (Hgb) and hematocrit (Hct)
      2) Urine specific gravity increased above 1.030
      3) Serum sodium (Na) increased above 145
      4) Elevated blood urea nitrogen (BUN) with normal creatinine

ANSWERS TO TEST

10. a. Obtain a nursing history to ascertain possibility of dehydration
    b. Observe for signs of dehydration
    c. Maintain accurate I & O record for patients who may be at high risk
    d. Watch laboratory-report values; report if abnormal
    e. Obtain order for appropriate laboratory tests if none are ordered
    f. Maintain correct flow rate if patient is on IV therapy
    g. Document carefully, on appropriate chart forms, all observations, assessments, and actions

11. Discussion should include the following
    a. Failure of an organ or organ system
    b. Improper administration of IV fluids

12. a. Unexplained increase in respiratory rate
    b. Dry, hacky cough
    c. Increased and/or bounding pulse
    d. Dyspnea
    e. Restlessness and/or disorientation
    f. Rales
    g. Neck-vein distention
    h. Irregular pulse
    i. Dependent edema

13. b, c, f, g, h, j

14.

a.	1	f.	3
b.	8	g.	7
c.	5	h.	6
d.	9	i.	4
e.	2		

15. Evaluated to the satisfaction of the instructor

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

UNIT OBJECTIVE

After completing this unit, the student should be able to identify a patient and collect any necessary data required for IV therapy. The student should also be able to explain IV therapy to the patient and prepare IV therapy. This knowledge will be shown by completing assignment sheet, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match to their correct definitions terms associated with preparation and assessment for IV therapy.
2. State steps used to identify patient for IV therapy.
3. List information obtained by collecting data related to IV therapy.
4. List points to observe when documenting data obtained.
5. Select from a list points to cover when explaining IV therapy to patient.
6. Describe the preparation of the nurse.
7. Collect patient data pertinent to IV therapy.
8. Demonstrate the ability to
    a. Perform proper handwashing.
    b. Prepare to begin IV therapy.

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

SUGGESTED ACTIVITIES

I. Suggested activities

  A. Order materials to supplement unit.

  B. Give pretest.

  C. Provide students with objective sheet.

  D. Provide students with information, assignment, and job sheets.

  E. Discuss unit and specific objectives.

  F. Discuss information, assignment, and job sheets.

  G. Individualize instruction for students with special needs.

  H. Use assignment sheet to develop role playing activities for collecting patient data.

  I. Demonstrate and discuss procedures outlined in job sheets.

  J. Group students in pairs, and have them role play the following techniques:

    1. Identifying a patient requiring IV therapy.

    2. Explaining required IV therapy.

  K. Give test.

  L. Discuss test.

  M. Reteach if necessary.

II. Instructional materials

  A. Objective sheet

  B. Suggested activities

  C. Information sheet

  D. Assignment Sheet #1--Collect Patient Data Pertinent to IV Therapy

  E. Answers to assignment sheet

  F. Job sheets

    1. Job Sheet #1--Perform Proper Handwashing

SUGGESTED ACTIVITIES

2. Job Sheet #2--Prepare to Begin IV Therapy

G. Test

H. Answers to test

III. Unit references

A. Breiting, Joan. "Are you Fudging on Handwashing Routines?" *RN,* Vol. 40, No. 6 (June 1977), p. 71.

B. Fleming, Kathleen, and Vivian Fineman. "The Right Things to Say About IV's." *RN,* Vol. 44, No. 9 (August 1981), p. 29-31.

C. Plumer, Ada L. *Principles and Practices of IV Therapy,* 2nd ed. Boston: Little, Brown & Co., 1970.

D. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medication: A Guide to Preparation, Administration, and Nursing Management.* Philadelphia: J.B. Lippincott Company, 1980.

E. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary,* 14th ed. Philadelphia: F.A. Davis Co., 1981.

F. West, Samuel Richard, ed. *Managing IV Therapy: Nursing Photobook.* Horsham, Pennsylvania: Intermed Communications, Inc., 1980.

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

INFORMATION SHEET

I. Terms and definitions

   A. Communication--Exchange of information by talk, gestures, or writing

   B. Confident--Assured; certain; sure of oneself

   C. Data--Facts from which conclusions can be inferred

   D. Document--Anything written to record or prove something

   E. Hygiene--System of principles for preservation of health and prevention of disease

   F. Identification--Anything by which a person or thing can be identified

   G. Misconception--To interpret wrongly; misunderstand

   H. Mobility--To be able to move about

   I. Pertinent--Relevant; of or connected with the matter at hand

   J. Psychological--Pertaining to the mind

   K. Terminology--Terms used in a specific field of art or science

   L. Verify--To confirm

II. Steps used to identify patient for IV therapy

   A. Verify order for IV therapy by checking the communication/verification tool used in specific institution for specific order; then check communication/verification tool against doctor's original order

   (NOTE: Communication/verification policy procedure varies with each institution.)

   EXAMPLES: Medication card, IV board, Kardex

   B. Ask patient his or her name

   C. Compare name given by patient to that listed on communication/verification tool and patient's hospital identification band

   D. Compare hospital number listed on communication/verification tool with that listed on patient's identification band

INFORMATION SHEET

III. Information obtained by collecting data related to IV therapy (Assignment Sheet #1)

(NOTE: The collection of patient data is called a *nursing history.*)

A. Present knowledge of IV therapy

B. Previous history of IV therapy

EXAMPLES: Good or bad experiences, fears

(NOTE: The terminology used must be at the patient's level of understanding. For instance, the term *IV* may not be understood, so the term *intravenous fluids* may be required.)

C. Allergies

EXAMPLES: Allergies to tape, betadine, iodine, plastic catheters

D. Underlying health problems or disease states

EXAMPLES: Congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), renal failure, liver failure, diabetes, physical disabilities

E. Understanding of need for present IV therapy

IV. Points to observe when documenting data obtained

A. Patient's understanding of need for IV therapy

B. Pertinent information

EXAMPLES: Allergies, chronic health problems

(NOTE: This information must be written on a communication form, such as the patient's Kardex, so that all personnel caring for the patient have access to it.)

V. Points to cover when explaining IV therapy to patient

(NOTE: Explanation must be given before any equipment is taken into the room. Explanation should include points on body hygiene, such as bathing, showering, brushing teeth, and using the bathroom. Include information on maneuvering the IV.)

A. What an IV is

(NOTE: This is the time to correct any misconceptions the patient may have.)

B. Why IV therapy is needed

(NOTE: Remember, the patient has the right to refuse. How you approach a patient can often mean the difference between cooperation and refusal.)

INFORMATION SHEET

C. Who will insert the needle

D. How procedure will be done

E. How much approximate discomfort patient can expect

(NOTE: Never tell a patient that the IV will not hurt. Explain that the only pain experienced is during the insertion, and that after the needle is in place and secured, it should not hurt.)

F. How long IV will stay in

(NOTE: Explain that the IV will stay in until the physician decides that the patient can eat and drink enough for his or her body's needs, or until the medication can be stopped or taken by mouth, or until the possibility for the need of emergency medications is over.)

G. How patient can cooperate with therapy

EXAMPLE: "Never move the flow-control clamp"; "Call nurse if a change is noted in the flow rate or at the insertion site."

H. Why patient may or may not eat or drink

I. How IV will limit patient's mobilty

VI. Preparation of the nurse

A. Psychological aspects

1. Be confident

(NOTE: Being confident of successfully performing venipuncture is the main reason some nurses are so good at inserting IV's.)

2. Desire to gain or improve a skill

(NOTE: Do not be afraid to fail. Even the best have bad days.)

B. Physical aspects (Job Sheets #1 and #2)

1. Perform proper handwashing

2. Prepare (organize) for IV therapy

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

ASSIGNMENT SHEET #1--COLLECT PATIENT DATA PERTINENT TO IV THERAPY

NAME ______________________________ SCORE ______________

The purpose of this assignment sheet is to give you the opportunity to practice collecting data before you approach an actual patient. Such practice will help you gain confidence in interacting with your patients.

Divide into pairs, with one person assuming the role of patient and the other the role of nurse. The person assuming the role of patient may give answers of a personnel nature or make up answers. The "nurse" should keep this assignment sheet to record answers to the following questions:

A. What do you know about IV therapy? ______________________________

____

____

B. Have you ever had an IV, and if so, what did you think of it? ______________

____

____

C. Do you have any allergies? ______________________________

____

____

D. Do you have any health problems? ______________________________

____

____

E. Do you know why you are to receive IV therapy? ______________________

____

____

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

ANSWERS TO ASSIGNMENT SHEET

Assignment Sheet #1--Evaluated to the satisfaction of the instructor

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

JOB SHEET #1--PERFORM PROPER HANDWASHING

I. Equipment

A. Sink with hot and cold water

B. Soap

C. Paper towels

D. Wastebasket

II. Procedure

A. Turn water on to a comfortably warm temperature

B. Open soap if using a bar

(NOTE: Soap with a foot control is the preferred type.)

C. Wet hands

D. Lather with soap

E. Scrub for at least fifteen seconds

(NOTE: One minute is preferred if possible.)

F. Direct hands downward into sink

G. Rinse hands under running water

H. Dry hands with paper towel

I. Turn off faucet with paper towel

J. Dispose of paper towels in wastebasket

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

TEST

NAME ______________________ SCORE __________

1. Match to their correct definitions terms associated with preparation and assessment for IV therapy. Write the correct numbers in the blanks.

_____a. System of principles for preservation of health and prevention of disease

_____b. To be able to move about

_____c. To confirm

_____d. Exchange of information by talk, gestures, or writing

_____e. Pertaining to the mind

_____f. To interpret wrongly; misunderstand

_____g. Assured; certain; sure of oneself

_____h. Anything by which a person or thing can be identified

_____i. Relevant; of or connected with the matter at hand

_____j. Facts from which conclusions can be inferred

_____k. Terms used in a specific field of art or science

_____l. Anything written to record or prove something

1. Communication
2. Confident
3. Data
4. Document
5. Hygiene
6. Identification
7. Misconception
8. Mobility
9. Pertinent
10. Psychological
11. Terminology
12. Verify

2. State steps used to identify patient for IV therapy.

a. ____

____

b. ____

____

c. ____

____

d. ____

____

TEST

3. List information obtained by collecting data related to IV therapy.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

4. List points to observe when documenting data obtained.

a. ______________________________

b. ______________________________

5. Select from the following list points to cover when explaining IV therapy to patient. Write an "X" in the blank before each correct answer.

______a. How patient can cooperate with therapy

______b. Why patient's identification bracelet is taped to head of bed

______c. Why IV can be removed any time patient requests

______d. What an IV is

______e. Why patient must ignore the IV after it is in place

______f. How much approximate discomfort patient can expect

______g. Why patient may or may not eat or drink

______h. Why only very ill patients have IV therapy

______i. How procedure will be done

______j. Why bed rest is required whenever an IV is in place

______k. How IV will limit patient's mobility

______l. Why extremity the IV is in must be kept very still

______m. Why IV therapy is needed

______n. Who will insert the needle

______o. How patient can reset the clamp

______p. How long IV will stay in

TEST

6. Describe the preparation of the nurse.

   a. Psychological aspects--____

   ____

   ____

   b. Physical aspects--____

   ____

   ____

(NOTE: Test questions 7 and 8 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

7. Collect patient data pertinent to IV therapy.

8. Demonstrate the ability to

   a. Perform proper handwashing.

   b. Prepare to begin IV therapy.

PREPARATION AND ASSESSMENT FOR IV THERAPY
UNIT IV

ANSWERS TO TEST

1. a. 5
   b. 8
   c. 12
   d. 1
   e. 10
   f. 7
   g. 2
   h. 6
   i. 9
   j. 3
   k. 11
   l. 4

2. a. Verify order for IV therapy by checking communication/verification tool used in specific institution for specific order; then check communication/ verification tool against doctor's original order
   b. Ask patient his or her name
   c. Compare name given by patient to that listed on communication/verification tool and patient's hospital identification band
   d. Compare hospital number listed on communication/verification tool with that listed on patient's identification band

3. a. Present knowledge of IV therapy
   b. Previous history of IV therapy
   c. Allergies
   d. Underlying health problems or disease states
   e. Understanding of need for present IV therapy

4. a. Patient's understanding of need for IV therapy
   b. Pertinent information

5. a, d, f, g, i, k, m, n, p

ANSWERS TO TEST

6. Description should include the following
   a. Pychological aspects
      1) Be confident
      2) Desire to gain or improve a skill
   b. Physical aspects
      1) Perform proper handwashing
      2) Prepare (organize) for IV therapy

7. Evaluated to the satisfaction of the instructor

8. Performance skills evaluated to the satisfaction of the instructor

SOLUTIONS AND CONTAINERS
UNIT V

UNIT OBJECTIVE

After completing this unit, the student should be able to identify and choose correct IV solutions. This knowledge will be shown by completing assignment sheet, job sheet, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match to their correct definitions terms associated with solutions and containers.
2. Select from a list points to consider when selecting IV solutions.
3. List types of IV solutions.
4. Distinguish among characteristics of IV containers.
5. Distinguish among interchangeable IV solutions.
6. Demonstrate the ability to follow correct procedure in choosing an IV solution.

SOLUTIONS AND CONTAINERS
UNIT V

SUGGESTED ACTIVITIES

I. Suggested activities

   A. Obtain examples of the following containers, if possible.

      1. Vented glass bottle
      2. Nonvented glass bottle
      3. Plastic bottle
      4. Plastic bag

   B. Pretest students to assess their present knowledge of the subject.

   C. Provide students with objective sheet.

   D. Provide students with information, assignment, and job sheets.

   E. Discuss unit and specific objectives.

   F. Discuss information sheet.

   G. Individualize instruction for students with special needs.

   H. Discuss assignment sheet.

   I. Demonstrate and discuss procedures outlined in job sheet.

   J. Give test.

   K. Discuss test.

   L. Reteach if necessary.

II. Instructional materials

   A. Objective sheet

   B. Suggested activities

   C. Information sheet

   D. Assignment sheet: Assignment Sheet #1--Distinguish Among Interchangeable IV Solutions

   E. Answers to assignment sheet

SUGGESTED ACTIVITIES

F. Job Sheet #1--Follow Correct Procedure in Choosing an IV Solution

G. Test

H. Answers to test

III. Unit references

A. Plumer, Ada L. *Principles and Practices of IV Therapy,* 2nd ed. Boston: Little, Brown & Co., 1970.

B. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management.* Philadelphia: J. B. Lippincott Co., 1980.

C. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary,* 14th ed. Philadelphia: F. A. Davis Co., 1981.

D. West, Richard Samuel, ed. *Managing IV Therapy,* Nursing Photobook Series. Horsham, Pennsylvania: Intermed Communications, Inc., 1980.

SOLUTIONS AND CONTAINERS
UNIT V

INFORMATION SHEET

I. Terms and definitions

A. Additive port--Place where a substance can be added to a container

B. Clarity--Clearness

C. Collapse--To shrink together; to cave in

D. Contaminate--To make impure, unclean; pollute

E. Electrolyte--Dissolved compound that can carry an electrical charge

EXAMPLES: K+, Na+, Cl-

F. Expiration date--Date after which solution can no longer be considered usable

G. Filter--Device for straining out impurities

H. Interchangeable--Capable of using each of two things in place of the other

I. Particulate matter--Minute, separate pieces of materials

J. Percentage--Given rate or proportion of a set amount

K. Tampered--Interfered with

L. Vent--Small opening to allow passage or escape of a gas

M. Volume--Quantity or amount of occupied space

II. Points to consider when selecting IV solutions

(NOTE: IV solutions made by different companies may be interchangeable even though they have different names, such as Normosol-M and Isolyte S. However, solutions with similar names are often not interchangeable, such as lactated Ringer's injection and Ringer's injection. Check with the pharmacy if in doubt about the interchangeability of solutions.)

A. Type of solution

EXAMPLE: Dextrose solution cannot be interchanged with saline solution.

B. Percentage of dextrose or saline

EXAMPLE: Five percent dextrose in water is not interchangeable with 10% dextrose in water.

C. Contents of electrolyte or amino acid solutions

EXAMPLES: Plasma-Lyte 56 is not interchangeable with Plasma-Lyte 148.
Plasma-Lyte 56 is interchangeable with Normosol-M.

INFORMATION SHEET

III. Types of IV solutions (Assignment Sheet #1; Job Sheet #1)

A. Dextrose

1. 5% dextrose in water
2. 10% dextrose in water
3. 5% dextrose in water with alcohol 5%

B. Dextrose/saline

1. 5% dextrose in 0.9% sodium chloride with alcohol 5%
2. 5% dextrose in 0.2% sodium chloride (5% dextrose in 1/4 saline)
3. 5% dextrose in 0.45% sodium chloride (5% dextrose in 1/2 saline)
4. 5% dextrose in 0.9% sodium chloride (5% dextrose in normal saline)

C. Saline

1. 0.2% sodium chloride (1/4 saline)
2. 0.3% sodium chloride (1/3 saline)
3. 0.45% sodium chloride (1/2 saline)
4. 0.9% sodium chloride (normal saline or sodium injection)

D. Lactated

1. Sodium lactate (1/6 molar)
2. Lactated Ringer's injection

E. Dextrose/lactated Ringer's injection

1. 5% dextrose in lactated Ringer's injection
2. 10% dextrose in lactated Ringer's injection

F. Dextrose/Ringer's injection--5% dextrose in Ringer's injection

G. Ringer's injection--Hartmann's injection

H. Invert sugar/water

1. Invert sugar 5% in water
2. Invert sugar 10% in water

INFORMATION SHEET

I. Electrolyte

1. Plasma-Lyte 56 in 5% dextrose (Travenol)
2. Polyonic M 56 in 5% dextrose (Cutter)
3. Normosol-M in 5% dextrose (Abbott)
4. Isolyte S in 5% dextrose (McGaw)

(NOTE: Solutions listed in 1 through 4 are interchangeable.)

5. Plasma-Lyte 148 in 5% dextrose (Travenol)
6. Polyonic M 148 in 5% dextrose (Cutter)
7. Normosol-R in 5% dextrose (Abbott)
8. Isolyte R in 5% dextrose (McGaw)

(NOTE: Solutions listed in 5 through 8 are interchangeable.)

J. Amino acid

(NOTE: These solutions are interchangeable.)

1. Travasol 3.5%, 5%, 7.5%, and 10% (Travenol)
2. Freamine II (McGaw)
3. Aminosol 3.5%, 5%, and 7.5% (Abbott)
4. Veinamine 8% (Cutter)

IV. Characteristics of IV containers

A. Plastic bags and bottles (Figures 1 and 2)

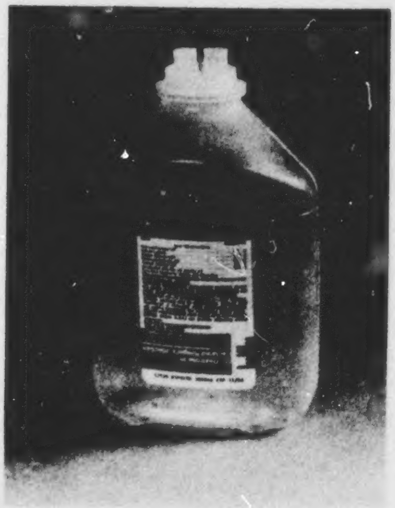
1. Collapse as fluid runs out

INFORMATION SHEET

2. Do not require vented IV tubing

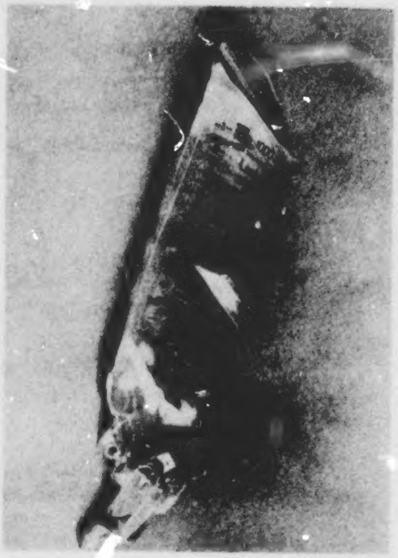
EXAMPLES:

FIGURE 1



Plastic Bag

FIGURE 2



Plastic Bottle

B. Vented glass bottles (Figure 3)

1. Have an inside airway

   (NOTE: Air must enter to equalize pressure as solution runs out.)

2. Do not require vented IV tubing

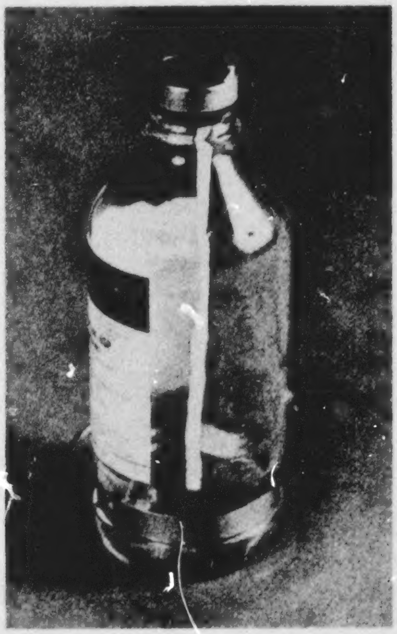
INFORMATION SHEET

3. Require removal of rubber seal to allow air to enter bottle

(NOTE: This rubber seal must be removed before the bottle is spiked. Medication can be added before this seal is removed.)

EXAMPLE:

FIGURE 3



Vented Glass Bottle

C. Nonvented glass bottles (Figure 4)

1. Do not have an inside airway

2. Require an airway

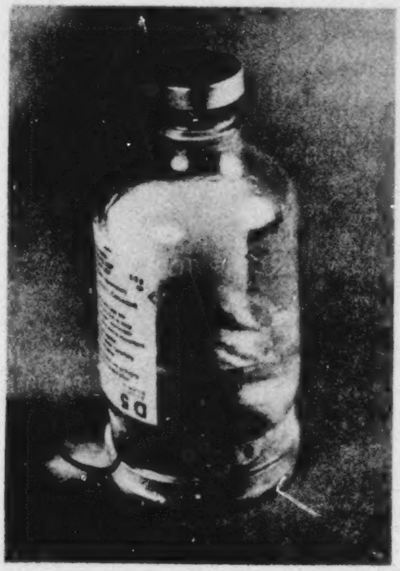
INFORMATION SHEET

3. Require vented IV tubing

   (NOTE: If vented tubing is *absolutely* unavailable, a filtered needle may be inserted into the bottle beside the spike of the tubing. Use of a plain needle is not desirable because it does not have a filtering system.)

   EXAMPLE:

FIGURE 4



Nonvented Glass Bottle

SOLUTIONS AND CONTAINERS
UNIT V

ASSIGNMENT SHEET #1--DISTINGUISH AMONG INTERCHANGEABLE IV SOLUTIONS

NAME ______________________________ SCORE ______________

This assignment sheet will aid you in the selection of the correct IV solution, especially when the common name or another brand name is written on the doctor's order sheet.

PART I

Match types of IV solutions to solutions that they can be interchanged with. Write the correct numbers in the blanks. A blank may contain more than one correct answer.

_____A. 1/4 saline

_____B. Normal saline

_____C. 1/3 saline

_____D. 5% dextrose in 1/2 saline

_____E. 1/2 saline

_____F. 5% dextrose in 1/4 saline

1. 0.3% sodium chloride
2. 5% dextrose in 0.2% sodium chloride
3. 0.45% sodium chloride
4. 0.2% sodium chloride
5. 0.9% sodium chloride
6. Sodium injection
7. 5% dextrose in 0.45% sodium chloride

PART II

Match electrolyte and amino acid solutions to their interchangeable solutions. Write the correct numbers in the blanks. Answers may be used more than once. Continued on the next page.

_____A. Polyonic M 56 in 5% dextrose (Cutter)

_____B. Plasma-Lyte 148 in 5% dextrose (Travenol)

_____C. Aminosol 3.5%, 5%, and 7.5% (Abbott)

_____D. Normosol-M in 5% dextrose (Abbott)

1. Plasma-Lyte 56 in 5% dextrose (Travenol)
2. Freamine II (McGaw)
3. Isolyte R in 5% dextrose (McGaw)

ASSIGNMENT SHEET #1

_____E. Veinamine 8% (Cutter)

_____F. Polyonic M 148 in 5% dextrose (Cutter)

_____G. Normosol-R in 5% dextrose (Abbott)

_____H. Travasol 3.5%, 5%, 7.5%, and 10% (Travenol)

SOLUTIONS AND CONTAINERS
UNIT V

ANSWERS TO ASSIGNMENT SHEET

PART I

A. 4
B. 5, 6
C. 1
D. 7
E. 3
F. 2

PART II

A. 1
B. 3
C. 2
D. 1
E. 2
F. 3
G. 3
H. 2

SOLUTIONS AND CONTAINERS
UNIT V

JOB SHEET #1--FOLLOW CORRECT PROCEDURE IN CHOOSING AN IV SOLUTION

I. Equipment

A. Patient's Kardex and/or medication/IV solution card

(NOTE: Some hospitals use an IV board.)

B. Prescribed IV solution

II. Procedure

A. Plastic bag

1. Verify patient's need for IV therapy
2. Select correct solution
3. Select correct volume
4. Open protective covering over bag

   (NOTE: When the pharmacy adds something to a bag, this protective covering will have been removed and the bag labeled. A small amount of moisture will be present in this covering to lengthen shelf life.)

5. Hold bag up to light and check solution for clarity

   (CAUTION: If solution is discolored or if it contains particulate matter, do not use. Send bag back to pharmacy or to central supply for a refund.)

6. Check expiration date
7. Gently squeeze bag

   (NOTE: If there is a puncture in the bag, fluid will squirt out.)

   (CAUTION: If there is a puncture, do not use bag. Send bag back to pharmacy or central supply for a refund.)

8. Check plastic protective cap covering spike port of bag to make sure that it is tight and in place

   (CAUTION: If cap is missing or loose, do not use bag. Send bag back to pharmacy or central supply for a refund.)

9. Check rubber stopper covering additive port

   (CAUTION: If rubber stopper is missing, do not use bag. Send bag back to pharmacy or central supply for a refund.)

JOB SHEET #1

B. Vented glass bottle

1. Verify patient's need for IV therapy
2. Select correct solution
3. Select correct volume
4. Hold bottle up to light; examine solution for clarity, and examine bottle for cracks or breaks

   (NOTE: Simple scratches on the outside of the bottle will not cause contamination of the solution.)

   (CAUTION: If the crack or break appears to be completely through the glass or if there is any discoloration or particulate matter in the solution, do not use bottle. Send bottle back to pharmacy for a refund.)

5. Check expiration date
6. Check metal protective cap covering spike port of bottle

   (CAUTION: If cap appears to be tampered with, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

   (NOTE: When the pharmacy adds something to the solution, the spike port will usually be re-covered with a cap of a distinctive color.)

C. Nonvented glass bottle

1. Verify patient's need for IV therapy
2. Select correct solution
3. Select correct volume
4. Hold bottle up to light; examine solution for clarity, and examine bottle for cracks or breaks

   (NOTE: Simple scratches on the outside of the bottle will not cause contamination of the solution.)

   (CAUTION: If the crack or break appears to be completely through the glass or if there is any discoloration or particulate matter in the solution, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

5. Check expiration date

JOB SHEET #1

6. Check metal protective cap covering spike port of bottle

   (CAUTION: If cap appears to be tampered with, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

   (NOTE: When the pharmacy adds something to the solution, the spike port will usually be re-covered with a cap of a distinctive color.)

7. Check rubber seal after metal protective cap is removed and just before bottle is spiked; listen for a hiss

   (CAUTION: If there is no hiss, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

D. Plastic bottle

1. Verify patient's need for IV therapy

2. Select correct solution

3. Select correct volume

4. Examine solution for clarity by holding up to light

   (CAUTION: If there is any discoloration or particulate matter in the solution, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

5. Gently squeeze bottle

   (NOTE: If there is a puncture in the bottle, fluid will squirt out.)

   (CAUTION: If there is a puncture, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

6. Check expiration date

7. Check plastic protective cap in spike port of bottle to make sure that it is tight and in place

   (CAUTION: If cap is loose or missing, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

8. Check rubber stopper in additive port

   (CAUTION: If stopper is missing, do not use bottle. Send bottle back to pharmacy or central supply for a refund.)

SOLUTIONS AND CONTAINERS
UNIT V

TEST

NAME ____ SCORE __________________

1. Match to their correct definitions terms associated with solutions and containers. Write the correct numbers in the blanks.

_____a. To make impure, unclean; pollute

_____b. Quantity or amount of occupied space

_____c. Minute, separate pieces of materials

_____d. Place where a substance can be added to a container

_____e. Small opening to allow passage or escape of a gas

_____f. Clearness

_____g. Given rate or proportion of a set amount

_____h. Dissolved compound that can carry an electrical charge

_____i. To shrink together; to cave in

_____j. Device for straining out impurities

_____k. Capable of using each of two things in place of the other

_____l. Interfered with

_____m. Date after which solution can no longer be considered usable

1. Additive port
2. Clarity
3. Collapse
4. Contaminate
5. Electrolyte
6. Expiration date
7. Filter
8. Interchangeable
9. Particulate matter
10. Percentage
11. Tampered
12. Vent
13. Volume

2. Select from the following list points to consider when selecting IV solutions. Write an "X" in the blank before each correct answer.

_____a. Percentage of dextrose or saline

_____b. Type of container

_____c. Insertion site

_____d. Type of solution

_____e. Urgency of need for solution

_____f. Contents of electrolyte or amino acid solutions

TEST

3. List one of each of the following types of IV solutions.

   a. Dextrose--________________________________

   b. Dextrose/saline--________________________________

   c. Saline--________________________________

   d. Lactated--________________________________

   e. Dextrose/lactated Ringer's injection--________________________

   f. Dextrose/Ringer's injection--________________________

   g. Ringer's injection--________________________________

   h. Invert sugar/water--________________________________

   i. Electrolyte--________________________________

   j. Amino acid--________________________________

4. Distinguish among characteristics of IV containers. Write the correct numbers in the blanks. Answers may be used more than once. Some blanks may contain more than one correct answer.

   _____a. Require an airway

   _____b. Collapse as fluid runs out

   _____c. Have an inside airway

   _____d. Do not require vented IV tubing

   _____e. Do not have an inside airway

   _____f. Require removal of rubber seal to allow air to enter bottle

   _____g. Require vented IV tubing

   1. Nonvented glass bottles
   2. Plastic bags and bottles
   3. Vented glass bottles

(NOTE: Test questions 5 and 6 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

5. Distinguish among interchangeable IV solutions.

6. Demonstrate the ability to follow correct procedure in choosing an IV solution.

SOLUTION AND CONTAINERS
UNIT V

ANSWERS TO TEST

1. a. 4
   b. 13
   c. 9
   d. 1
   e. 12
   f. 2
   g. 10
   h. 5
   i. 3
   j. 7
   k. 8
   l. 11
   m. 6

2. a, d, f

3. Answers should include one of each of the following types of solutions
   a. Dextrose
      1) 5% dextrose in water
      2) 10% dextrose in water
      3) 5% dextrose in water with alcohol 5%
   b. Dextrose/saline
      1) 5% dextrose in 0.9% sodium chloride with alcohol 5%
      2) 5% dextrose in 0.2% sodium chloride (5% dextrose in 1/4 saline)
      3) 5% dextrose in 0.45% sodium chloride (5% dextrose in 1/2 saline)
      4) 5% dextrose in 0.9% sodium chloride (5% dextrose in normal saline)
   c. Saline
      1) 0.2% sodium chloride (1/4 saline)
      2) 0.3% sodium chloride (1/3 saline)
      3) 0.45% sodium chloride (1/2 saline)
      4) 0.9% sodium chloride (normal saline or sodium injection)

ANSWERS TO TEST

d. Lactated
   1) Sodium lactate (1/6 molar)
   2) Lactated Ringer's injection

e. Dextrose/lactated Ringer's injection
   1) 5% dextrose in lactated Ringer's injection
   2) 10% dextrose in lactated Ringer's injection

f. Dextrose/Ringer's injection--5% dextrose in Ringer's injection

g. Ringer's injection--Hartmann's injection

h. Invert sugar/water
   1) Invert sugar 5% in water
   2) Invert sugar 10% in water

i. Electrolyte
   1) Plasma-Lyte 56 in 5% dextrose (Travenol)
   2) Polyonic M 56 in 5% dextrose (Cutter)
   3) Normosol-M in 5% dextrose (Abbott)
   4) Isolyte S in 5% dextrose (McGaw)
   5) Plasma-Lyte 148 in 5% dextrose (Travenol)
   6) Polyonic M 148 in 5% dextrose (Cutter)
   7) Normosol-R in 5% dextrose (Abbott)
   8) Isolyte R in 5% dextrose (McGaw)

j. Amino acid
   1) Travasol 3.5%, 5%, 7.5%, and 10% (Travenol)
   2) Freamine II (McGaw)
   3) Aminosol 3.5%, and 5%, 7.5% (Abbott)
   4) Veinamine 8% (Cutter)

4. a. 1
   b. 2
   c. 3
   d. 2, 3
   e. 1
   f. 3
   g. 1

ANSWERS TO TEST

5. Evaluated to the satisfaction of the instructor

6. Performance skills evaluated to the satisfaction of the instructor

EQUIPMENT AND SUPPLIES
UNIT VI

UNIT OBJECTIVE

After completing this unit, the student should be able to distinguish among, select, and prepare for use the basic equipment and supplies for IV therapy. This knowledge will be shown by completing assignment sheets, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with equipment and supplies to their correct definitions.
2. Match types of IV tubing drip systems to their correct descriptions.
3. Distinguish among characteristics of microdrip and macrodrip IV tubing systems.
4. Discuss IV tubing containing multiple secondary ports.
5. Discuss IV tubing containing backcheck valves.
6. Distinguish among characteristics of vented and nonvented IV tubings.
7. Match types of clamps to their correct uses.
8. Select from a list characteristics of terminal filtering devices.
9. List points to consider when using a filtering device.
10. Distinguish among characteristics of basic IV needles and catheters.
11. Match types of IV needles and catheters to their correct uses.
12. Distinguish among advantages and disadvantages of basic IV needles and catheters.
13. Select from a list criteria for choosing the right type and size of needle or catheter.
14. Analyze the use of tubings and containers.
15. Demonstrate the ability to
    a. Spike an IV container and fill straight tubing.
    b. Fill tubing containing multiple secondary ports.
    c. Fill tubing containing backcheck valve.

OBJECTIVE SHEET

d. Fill tubing and filter.

e. Prepare wing-tipped needle for venipuncture.

f. Prepare wing-tipped needle as heparin lock.

g. Administer medication using wing-tipped heparin lock.

EQUIPMENT AND SUPPLIES
UNIT VI

SUGGESTED ACTIVITIES

I. Suggested activities

   A. Obtain equipment to supplement unit.

      1. Examples of IV tubings and drip systems

         a. Microdrip

         b. Macrodrip

         c. Multiple secondary valves

         d. Vented and nonvented

      2. At least one of the following IV tubings per student

         a. Straight tubing

         b. Multiple secondary ports

         c. Backcheck valve

         d. Vented

         e. Nonvented

         (NOTE: These tubings can be reused only after use on artificial arms. Be sure to save the protective caps and packaging.)

      3. Examples of clamps

         a. Slide

         b. Roller

         c. Screw

      4. Examples of containers

         a. Vented glass bottle

         b. Nonvented glass bottle

         c. Plastic bottle

         d. Plastic bag

SUGGESTED ACTIVITIES

5. At least one of each of the following IV containers per student

   a. Nonvented glass bottle

   b. Plastic bags

   (NOTE: These containers can be reused only after use on artificial arms.)

   (CAUTION: Distilled water must be used as the IV solution for practice with artificial arms. This is the only time distilled water may be used. The container must be emptied, rinsed, and refilled with distilled water.)

6. At least one filter per student

   (NOTE: Filters can be used only once. New filters will be required for each class.)

7. Examples of many types and sizes of needles and catheters

8. At least one of the following needles per student

   a. Wing-tipped

   b. Wing-tipped heparin lock

   (NOTE: These needles can be reused only on artificial arms. Be sure to save protective caps and packaging to be reused.)

9. Example of injection cap

10. Syringes and needles

    a. Four 3-milliliter syringes per student

    b. One 23-gauge needle and one 25-gauge needle per student

11. Distilled water

    (NOTE: The distilled water is used as a practice "medication" to fill needles.)

12. Alcohol sponges

B. Pretest students to assess their present knowledge of the subject.

C. Provide students with objective sheet.

D. Provide students with information, assignment, and job sheets.

E. Discuss unit and specific objectives.

SUGGESTED ACTIVITIES

F. Discuss information sheet.

G. Individualize instruction for students with special needs.

H. Obtain and show examples of each piece of equipment discussed in information sheet.

I. Discuss assignment sheets.

J. Demonstrate and discuss equipment and procedures outlined in job sheets.

K. Give test.

L. Discuss test.

M. Reteach if necessary.

II. Instructional materials

A. Objective sheet

B. Suggested activities

C. Information sheet

D. Assignment sheets

1. Assignment Sheet #1--Complete an IV Equipment and Supplies Crossword Puzzle
2. Assignment Sheet #2--Analyze the Use of Tubings and Containers

E. Answers to assignment sheets

F. Job sheets

1. Job Sheet #1--Spike an IV Container and Fill Straight Tubing
2. Job Sheet #2--Fill Tubing Containing Multiple Secondary Ports
3. Job Sheet #3--Fill Tubing Containing Backcheck Valve
4. Job Sheet #4--Fill Tubing and Filter
5. Job Sheet #5--Prepare Wing-Tipped Needle for Venipuncture
6. Job Sheet #6--Prepare Wing-Tipped Needle as Heparin Lock
7. Job Sheet #7--Administer Medication Using Wing-Tipped Heparin Lock

G. Test

H. Answers to test

SUGGESTED ACTIVITIES

III. Unit references

A. Masoorlic, Susan Thomas. "Trouble-Free IV Starts." *RN,* Vol. 44, No. 2, (February 1981), pp. 20-27.

B. Parent, Bea. "In-Line IV Filters--Are They Really Worthwhile?" *Nursing81,* Vol. 11, No. 9, (August 1981), pp. 58-60.

C. Plumer, Ada L. *Principles and Practices of IV Therapy,* 2nd ed. Boston: Little, Brown and Co., 1970.

D. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medications: A Guide to Preparation, Administration and Nursing Management.* Philadelphia: J. B. Lippincott, 1980.

E. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary,* 14th ed. Philadelphia: F.A. Davis Co., 1981.

F. West, Richard Samuel, ed. *Managing IV Therapy,* Nursing Photobook Series. Horsham, Pennsylvania: Intermed Communications, Inc., 1980.

EQUIPMENT AND SUPPLIES
UNIT VI

INFORMATION SHEET

I. Terms and definitions (Assignment Sheet #1)

A. Accessible--Obtainable; easily reached

B. Aspirate--To withdraw fluids or gases by suction

C. Biologic--Dealing with the physical characteristics of plants and animals

D. Clog--To obstruct; impede

E. Collapse--To shrink together; to cave in

F. Contaminate--To make impure or unclean

G. Distal--Away from the point of attachment

H. Distinctive--Having unmistakable characteristics

I. Elapse--To slip by; pass

J. Expel--To force out

K. Female adapter--Connection that fits over male adapter

L. Filter--Device for straining out impurities

M. Gauge--A measure; dimension

(NOTE: The larger the gauge number, the smaller the size.)

N. Housing--Shelter; covering

O. Inert--Inactive; having few or no active properties

P. Intermittent--Stopping and starting again at intervals

Q. Invert--To turn upside down

R. Male adapter--Connection that fits inside female adapter

S. Membrane--Thin, soft, pliable layer that covers or lines a body part

T. Micron--One millionth of a meter; one thousandth of a millimeter

U. Milliliter (ml)--One thousandth of a liter

INFORMATION SHEET

V. Particulate matter--Minute, separate pieces of material

W. Pores--Tiny openings through which fluids may pass

X. Port--Opening

Y. Primary--First in importance

Z. Simultaneous--Together at the same time

AA. Spike--Sharp, pointed projection

BB. Stylet--Slender metal device used to stiffen a catheter

CC. Thrust--To push with sudden force

DD. Tortuous--Consisting of or abounding in irregular bends or turns; twisting

EE. Transparent--So fine in texture as to be seen through

FF. Vacuum--Space exhausted of its fluid and/or air content

GG. Vent--Small opening to permit passage or escape of a gas

HH. Viscous--Sticky; thick in texture

II. Volume--Quantity or amount of occupied space

II. Types of IV tubing drip systems

A. Microdrip (Figure 1)

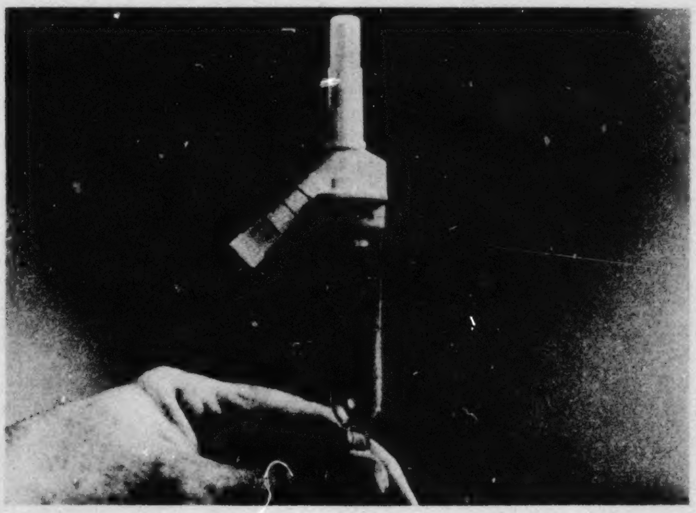
1. Has a distinctive metal tip where drop is formed
2. May also be called *minidrip* or *pediatric infusion set*
3. Forms very small drop

INFORMATION SHEET

4. Delivers 60 drops per milliliter

EXAMPLE:

FIGURE 1



B. Macrodrip (Figure 2)

1. Is called *infusion set*

EXAMPLES: Venoset, manufactured by Abbott Laboratories; Solution Administration set, manufactured by Travenol

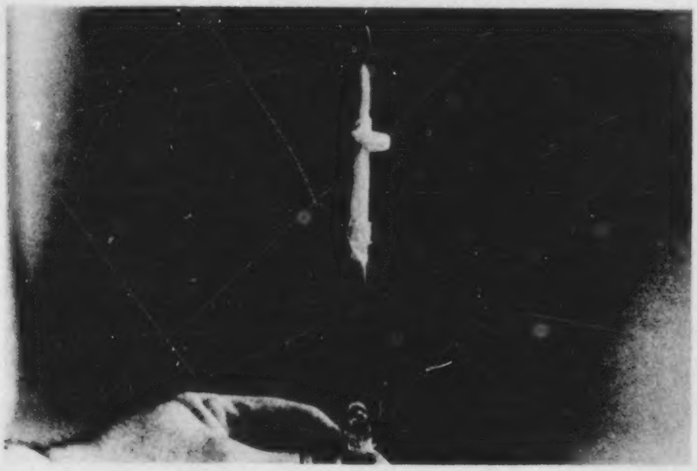
INFORMATION SHEET

2. Can deliver different drip rates per milliliter due to different-sized drops

(NOTE: The drop size is determined by the manufacturer.)

EXAMPLES: Travenol delivers 10 drops per milliliter; Abbott, Cutter, and McGaw deliver 15 drops per milliliter; IVAC delivers 20 drops per milliliter.

FIGURE 2



III. Characteristics of microdrip and macrodrip IV tubing systems (Job Sheet #1)

A. Microdrip

(NOTE: Microdrip tubing is the tubing used when the vein is to be kept open.)

1. Simplifies counting out and setting flow rate

EXAMPLE: If order is for 85 milliliters an hour, nurse can simply count out 85 drops per minute

2. Can deliver very small amounts over a long period of time

EXAMPLE: Flow rates of as low as 5 milliliters per hour can be maintained.

(NOTE: Small amounts can be delivered due to the small size of the drop and to less time elapsing between drops.)

3. Can deliver large volumes in a relatively short time

EXAMPLE: 1,000 milliliters in an hour

(NOTE: The volume and time will also depend upon the size of the IV needle or catheter in the patient's vein.)

INFORMATION SHEET

4. Helps prevent accidental overload

   (NOTE: Fluid overload is less likely to happen due to the small size of the drop.)

B. Macrodrip

1. Requires use of formula to calculate rate of drops per minute and flow rate

2. Can deliver very large volumes in a very short time

   EXAMPLE: 1,000 milliliters in fifteen to thirty minutes

   (NOTE: The volume and time will also depend upon the size of the needle or catheter in the patient's vein.)

IV. IV tubing containing multiple secondary ports (Job Sheet #2)

A. Consists of straight tubing with more than one secondary port

   (NOTE: These ports are also called *Y-injection sites*.)

B. Can have either type drip system

C. Can be used when administering multiple IV piggyback medications

D. Allows main IV solution and piggyback solution to run simultaneously

E. Is useful when both IV piggyback and IV push medications are ordered

V. IV tubing containing backcheck valves (Job Sheet #3)

A. Contains multiple secondary ports

B. Allows only one solution at a time to flow

   (NOTE: Valve in tubing just opposite or slightly below uppermost secondary port prevents flow of more than one solution at a time.)

C. Requires a short secondary IV tubing for infusion of medications

   (CAUTION: Whenever a tubing is inserted into another tubing with a needle, this connection must be taped. The secondary tubing must be left in place and changed only when the primary tubing is changed.)

D. Can be used when administering multiple IV piggyback medications

   (NOTE: The same secondary tubing is used for most IV piggyback medications.)

INFORMATION SHEET

VI. Characteristics of vented and nonvented IV tubings (Figure 3; Assignment Sheet #2)

A. Vented

EXAMPLE:

FIGURE 3

1. Consists of a straight IV tubing with either type drip system
2. May contain multiple secondary ports and/or backcheck valve
3. Has filtered opening to allow air to enter system

   (NOTE: The opening usually lies at the side of the uppermost part of the drip chamber.)

4. Must be used with nonvented glass bottles

   (NOTE: The vent allows air to enter this type container to replace the volume of fluid as it runs out. If the volume is not replaced, a vacuum will form and fluid cannot run out of the container.)

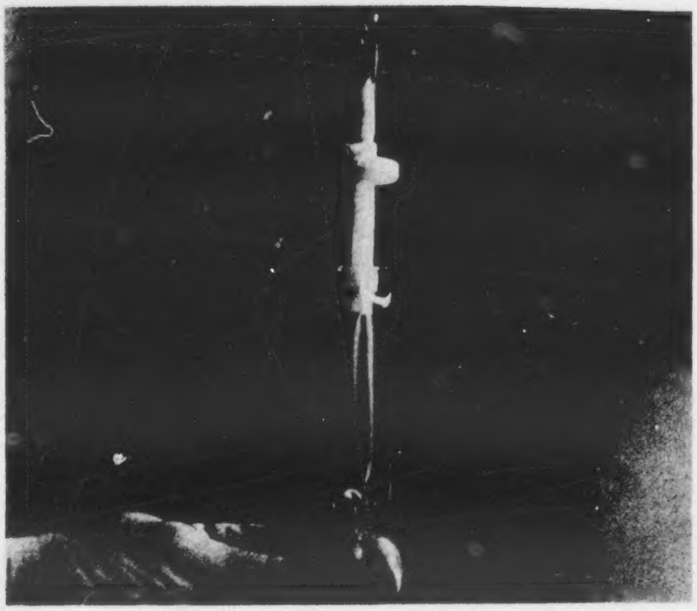
5. May also be used with any container

INFORMATION SHEET

B. Nonvented (Figure 4)

EXAMPLE:

FIGURE 4



1. Consists of straight IV tubing with either type drip system
2. May contain multiple secondary ports and/or backcheck valve
3. Is a closed system with no opening
4. May be used with vented glass bottle, plastic bag, or plastic bottle

   EXAMPLES: Travenol plastic bag, McGaw plastic bottle, Travenol glass bottle

   (NOTE: The plastic bag and bottle collapse as the fluid runs out, and there is no need to replace volume. The vented glass bottle contains an opening to allow air to enter.)

INFORMATION SHEET

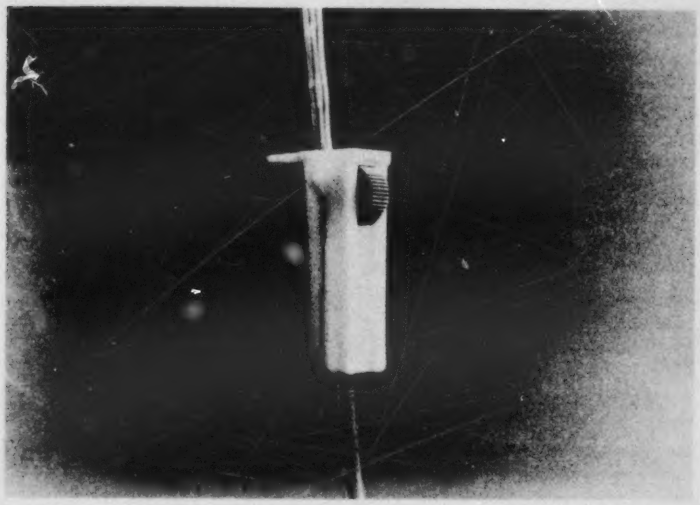
VII. Types of clamps and their uses

A. Roller--Used to regulate flow rate; thumb is used to move roller up to open line or down to close line (Figure 5)

(NOTE: The IV tubing can be pulled up taut from the bottom of the clamp and placed in a slot to close the flow without changing the clamp.)

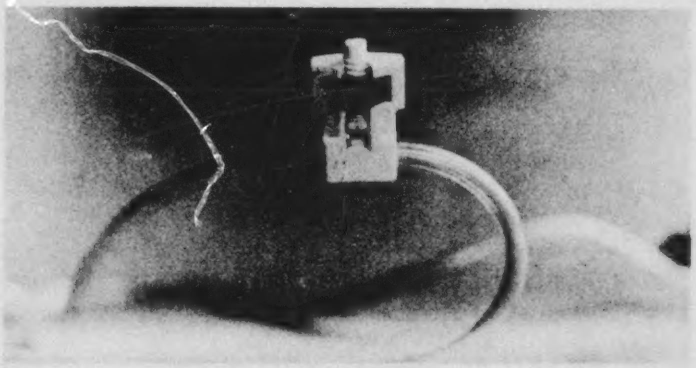
EXAMPLE:

FIGURE 5



B. Screw--Used to regulate flow rate; is turned clockwise to open line and counterclockwise to close line (Figure 6)

FIGURE 6



INFORMATION SHEET

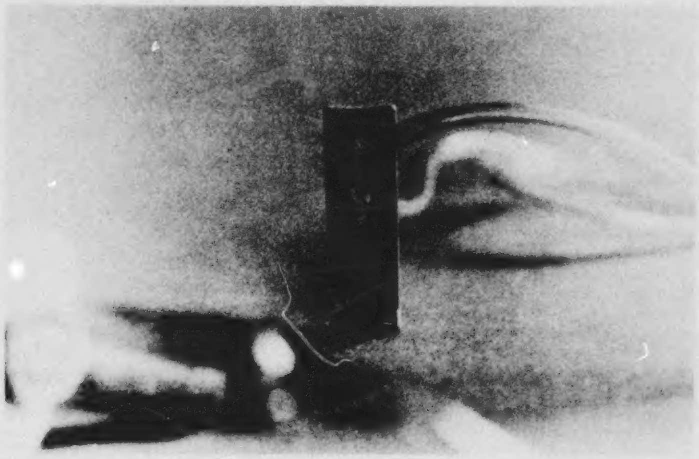
C. Slide--Used to turn IV on or off; tubing is slid into wide opening to turn IV on or into narrow opening to turn IV off (Figure 7)

(CAUTION: Some slide clamps are metal. Take care not to injure the patient with these clamps.)

(NOTE: The slide clamp should *not* be used to regulate flow rate.)

EXAMPLE:

FIGURE 7



VIII. Characteristics of terminal filtering devices (Figures 8 and 9)

A. Consist of a transparent filter housing and membrane filter

B. Come in many different sizes and types

C. Are used to remove particulate matter and contaminants such as bacteria and to eliminate air above filter

D. Have slide clamp to temporarily turn off flow of solution

E. May be built into IV tubing

F. May be a separate unit to be added to tubing

G. May contain secondary ports

(NOTE: Secondary ports permit the infusion of fluids such as blood, suspensions, and colloidal solutions below the filter. These fluids would occlude the filter.)

H. Contain filter element of biologically inert membrane with spongelike interlocking pores

INFORMATION SHEET

I. Have range of porosities from 0.22 microns to 3.5 microns

(NOTE: This range is useful for different requirements. The 3-micron to 5-micron range removes larger particles. The 0.45-micron removes large and fine particles and most bacteria. The 0.22-micron removes all large and fine particles and all bacteria, but the pore size is so small that an infusion pump is usually required to infuse the required volume of fluid.)

EXAMPLES:

FIGURE 8

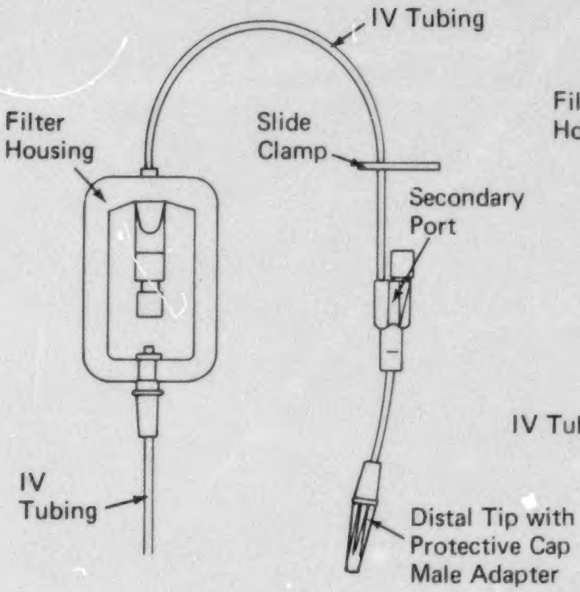
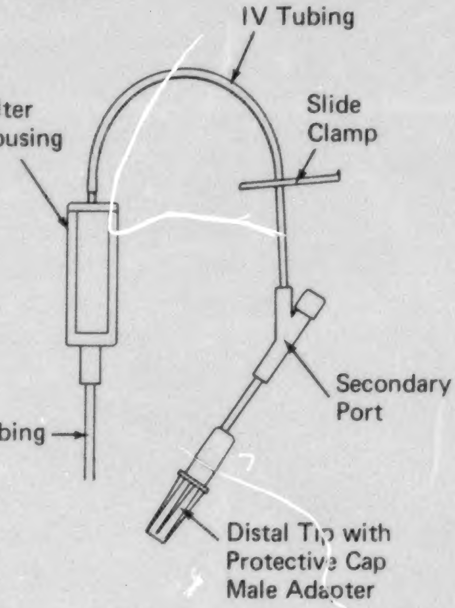


FIGURE 9



IX. Points to consider when using a filtering device (Job Sheet #4)

(NOTE: Some hospitals require the use of filters on all IVs.)

A. Risk of phlebitis is reduced

(NOTE: If multiple irritating solutions or medications are to be given, research has shown that the use of a filter definitely reduces the incidence of phlebitis.)

B. Correct-sized pore must be chosen to allow prescribed solution to infuse

C. Discoloration by particulate matter is sometimes seen in filter

(NOTE: The filter can continue to be used as long as the solution continues to infuse at the proper rate. This discoloration means that the filter is working properly by filtering out particles.)

INFORMATION SHEET

D. Highly viscous fluids must be piggybacked below the filter

E. Medication must be properly dissolved before infusing

F. Filter must be changed every twenty-four hours

(NOTE: When the filter removes large amounts of undissolved crystals, it may clog and will need to be changed more frequently.)

G. Filter is usually placed in the line below the pump when used with an infusion pump

(NOTE: The placement of a filter above or below an infusion pump depends upon the type of pump and IV solution used. Check the manufacturer's specifications for use with a filter.)

X. Characteristics of basic IV needles and catheters

A. Wing-tipped needle (Figure 10; Job Sheet #5)

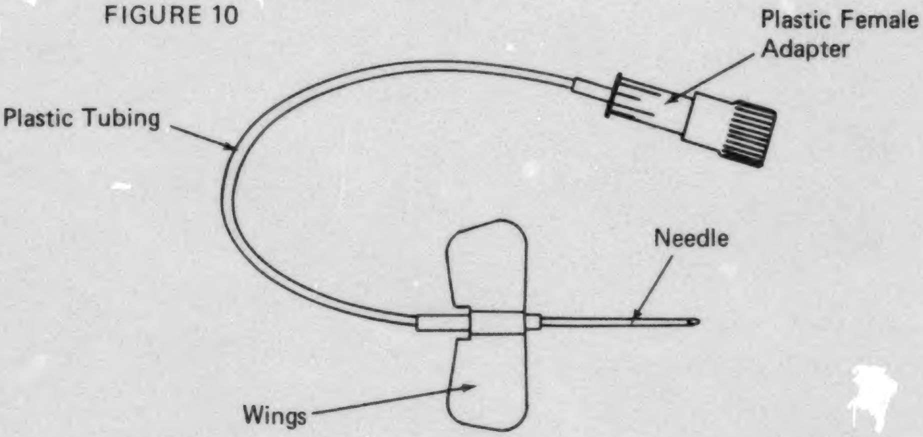
(NOTE: This type of needle is commonly called a *Butterfly*. Butterfly is the brand name for the wing-tipped needle manufactured by Abbott Laboratories.)

1. Consists of a short steel needle

2. Needle is connected to a flat piece of plastic (wings) and a short piece of plastic tubing with a plastic female adapter

EXAMPLE:

FIGURE 10



B. Over-the-needle catheter (ONC) (Figure 11)

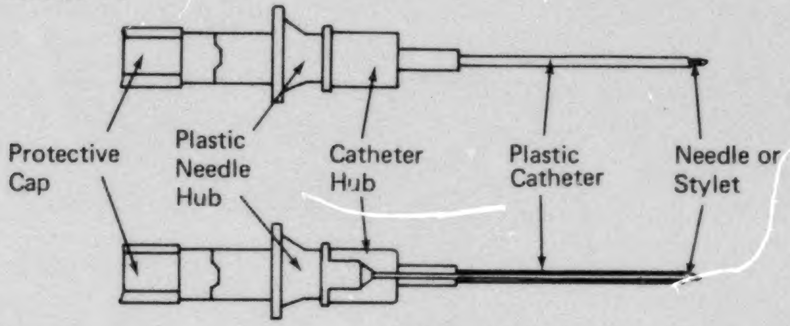
1. Consists of a 1/2-inch to 3-inch plastic catheter attached to a rigid hub

INFORMATION SHEET

2. Needle or stylet fits inside plastic catheter to facilitate entry through skin and into vein

EXAMPLE:

FIGURE 11



Cutaway View

C. Heparin lock (Figures 12 and 13; Job Sheets #6 and #7)

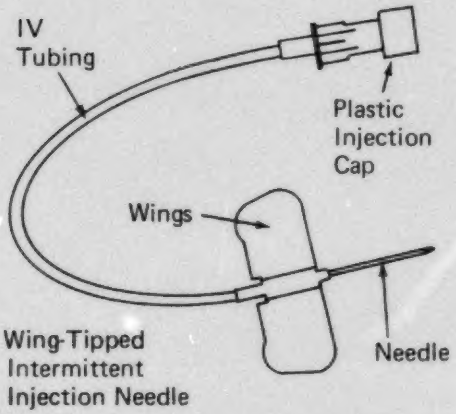
1. Can be either a wing-tipped needle or an over-the-needle catheter

2. Has an intermittent injection cap inserted in female adapter

(NOTE: The plastic injection cap can be fused into the tubing and be a permanent part of the device, or a separate injection cap can be placed on a regular wing-tipped needle or ONC.)

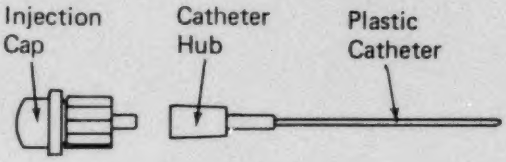
EXAMPLES:

FIGURE 12



Wing-Tipped Intermittent Injection Needle

FIGURE 13



ONC with Injection Cap

INFORMATION SHEET

XI. Types of IV needles and catheters and their uses

- A. Wing-tipped needle
  - 1. Infants and children
  - 2. Elderly patients or adults with small and/or tortuous veins
  - 3. Short-term IV therapy--less than twenty-four hours
  - 4. As a heparin lock
- B. Over-the-needle catheter
  - 1. Long-term therapy--over twenty-four hours
  - 2. Delivery of viscous liquids

    EXAMPLES: Peripheral hyperalimentation solution, blood and blood products
  - 3. Arterial monitoring
  - 4. As a heparin lock
- C. Heparin lock (Job Sheet #7)
  - 1. To provide route to give IV medication intermittently without using continuously running IV fluids
  - 2. To provide route to give emergency IV medications without using continuously running IV fluids

XII. Advantages and disadvantages of basic IV needles and catheters

- A. Wing-tipped needle
  - 1. Advantages
    - a. Is simple and easy to use
    - b. Is less painful upon insertion
    - c. Reduces touch contamination
    - d. Is less likely to trigger mechanical phlebitis
    - e. Is inserted by nurse

      (NOTE: Some chemotherapy drugs can be given only through a metal needle.)

INFORMATION SHEET

2. Disadvantages
    - a. Is less stable
    - b. Is unsuitable for infusing highly viscous liquids
    - c. Is unsuitable for long-term therapy
    - d. Can puncture vein and tends to infiltrate more easily because of inflexible needle point

B. Over-the-needle catheter

1. Advantages
    - a. Is less likely to puncture the vein and infiltrate because of flexible plastic

      (CAUTION: This advantage tends to make it possible for the catheter to be left in one site for long periods of time. The IV site must be changed every forty-eight to seventy-two hours to prevent the occurrence of other complications.)
    - b. Allows needle (stylet) to be completely removed after insertion
    - c. Allows patient greater mobility because of its stability
    - d. Is inserted by nurse

2. Disadvantages
    - a. Is more likely to damage vein during insertion
    - b. Is prone to touch contamination
    - c. Can support infection
    - d. Is likely to trigger a mechanical phlebitis

      (NOTE: The incidence of a mechanical phlebitis increases with the length of time the catheter is left at a given site.)

C. Wing-tipped heparin lock

1. Advantages
    - a. Allows greater patient mobility
    - b. Is more comfortable
    - c. Prevents risk of accidental fluid overload

INFORMATION SHEET

d. Reduces risk of complications of long-term IV therapy

EXAMPLES: Infiltration, phlebitis

e. Is less painful upon insertion

f. Reduces touch contamination

2. Disadvantages

a. Is less stable than ONC

b. Can puncture vein and tends to infiltrate more easily because of inflexible needle point

c. Must be flushed with heparin solution at intervals

d. Must be flushed before and after administering medication

(NOTE: The heparin flush solution is used to prevent the clotting of blood in the needle or catheter.)

D. Over-the-needle catheter heparin lock

1. Advantages

a. Is less likely to puncture the vein and infiltrate because of flexible plastic

b. Allows needle (stylet) to be completely removed after insertion

c. Allows patient greater mobility because of its stability

d. Prevents risk of accidental fluid overload

e. Permits conversion of existing venipuncture to a heparin lock by use of intermittent injection cap with ONC in place

(NOTE: Conversion prevents having to perform another venipuncture with resultant discomfort.)

f. Is more comfortable

2. Disadvantages

a. Is more likely to damage vein during insertion

b. Is prone to touch contamination

c. Can support infection

d. Is likely to trigger a mechanical phlebitis

INFORMATION SHEET

e. Must be flushed with heparin solution at intervals

f. Must be flushed before and after administering medication

(NOTE: The heparin flush solution is used to prevent the clotting of blood in the needle or catheter.)

XIII. Criteria for choosing the right type and size of needle or catheter

A. Choose smallest size possible for required therapy

(NOTE: A smaller size causes less trauma to the vein and allows a greater blood flow around the catheter or needle tip.)

B. Consider age of patient

(NOTE: If the patient is an infant, you will usually use a wing-tipped needle in a scalp vein, but you may use a small catheter. Scalp veins in an infant are very elastic and, if necessary, can accept a needle that appears too large for the vein. If the patient is a child, you may be able to use an ONC in the hand or arm.)

C. Consider size of patient and size of vein to be used

D. Consider length of therapy

(NOTE: You may use a wing-tipped needle if the order is for one or two units of blood only or if the patient is an outpatient and is to receive a one-time dose of medication. If the therapy is to last over twenty-four hours, use an over-the-needle catheter.)

E. Consider type of fluid to be given

(NOTE: Larger needle and vein are required for peripheral hyperalimentation solution, high-dextrose solutions, lipids, blood given rapidly.)

F. Consider insertion site

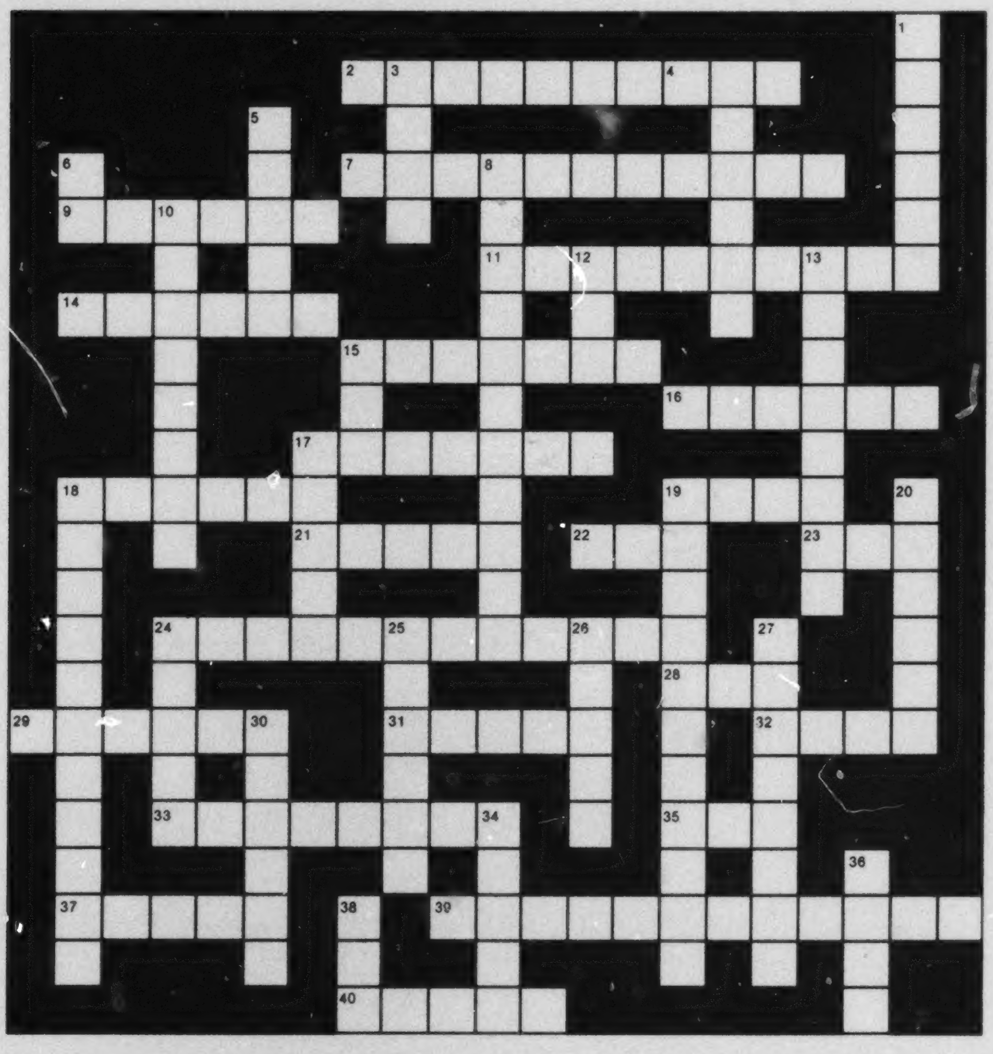
(NOTE: If inserted into a small vein of the finger or hand, a smaller needle is required.)

EQUIPMENT AND SUPPLIES
UNIT VI

ASSIGNMENT SHEET #1--COMPLETE AN IV EQUIPMENT AND SUPPLIES CROSSWORD PUZZLE

NAME ______________________________ SCORE ______________

By completing this crossword puzzle, you will be reinforcing your knowledge and grasp of the terms and definitions used in this unit. It is an entertaining exercise, yet it challenges you to think and remember. Clues are on the following page.



ASSIGNMENT SHEET #1

ACROSS

2. One thousandth of a liter
7. Minute, separate pieces
9. Space exhausted of its fluid and/or air content
11. Obtainable; easily reached
14. Device for straining out impurities
15. Shelter; covering
16. Slender metal device used to stiffen a catheter
17. First in importance
18. Away from the point of attachment
19. To obstruct; impede
21. Teacher's fruit
22. Abbreviation for *nil per os*
23. Frozen water
24. Stopping and starting again at intervals
28. Past tense of *eat*
29. To turn upside down
31. i.e., roller, slide, or screw
32. Adapter that fits inside female adapter
33. Twisting; containing irregular turns or bends
35. Neither _ _ _
37. Small openings to permit passage or escape of gas
39. Together at the same time
40. Tiny openings through which fluids may pass

DOWN

1. Quantity or amount of occupied space
3. Abbreviation for brand of macrodrip tubing that delivers 20 gtt/ml
4. To slip by; pass
5. A measure; dimension
6. Abbreviation for *intravenous*
8. So fine in texture as to be seen through
10. To shrink together; to cave in
12. Abbreviation for *cannula*
13. Dealing with the physical characteristics of plants and animals
15. Opposite of *him*
17. Site
18. Having unmistakable characteristics
19. To make impure or unclean
20. Adapter that fits over male adapter
24. Inactive; having few or no active properties
25. One millionth of a meter; one thousandth of a milliliter
26. To force out
27. Thin, soft, pliable layer that covers or lines a part
30. To push with sudden force
34. Sharp, pointed projection
36. Opening
38. End of needle or catheter

EQUIPMENT AND SUPPLIES
UNIT VI

ASSIGNMENT SHEET #2--ANALYZE THE USE OF TUBINGS AND CONTAINERS

NAME ______________________________ SCORE ______________

By completing this assignment sheet, you will become more familiar with the different types of tubings and containers. You will also be able to make the correct judgments in choosing and troubleshooting an IV tubing and container.

PART I

Match the types of IV tubings to be used with each container. Write the correct answer in the blanks. Answers may be used more than once.

_____A. Vented glass bottle	1. Vented tubing
_____B. Plastic bottle	2. Nonvented tubing
_____C. Nonvented glass bottle	
_____D. Plastic bag	

PART II

You have assumed the care of Mr. Jones at 11 P.M. After shift report, you get to Mr. Jones' room at 12 A.M. to check on him. He has an IV in place in the "R" forearm and an IV medication due at 12 A.M. You quickly check the patient and then prepare the medication. After the medication is prepared, you check the IV site and equipment. You find the site unremarkable and the equipment intact, but the IV solution is not running. The IV was hung at 10:45 P.M., and in the shift report, you were told that the IV was infusing well. The container is an Abbott bottle, and the tubing is IVAC nonvented tubing that was in place for the previous use of an IVAC infusion pump.

A. Why is the IV solution not infusing?

____

____

B. What corrective action should you take initially to try to establish flow?

____

____

ASSIGNMENT SHEET #2

C. What more permanent action should you take to maintain flow if establishment of flow was successful?

____

____

____

____

D. What actions will be necessary if establishment of flow was not successful?

____

____

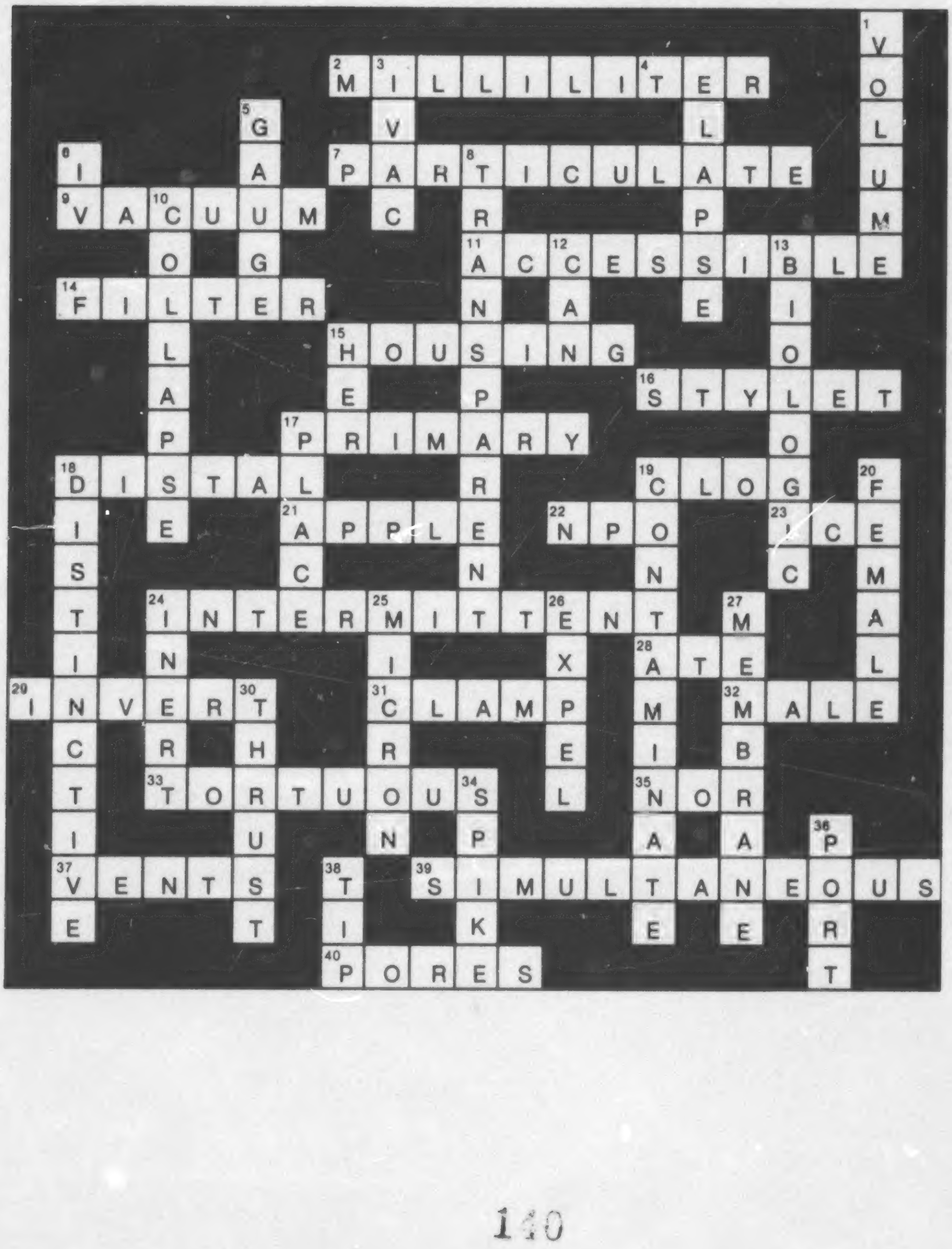
____

____

EQUIPMENT AND SUPPLIES
UNIT VI

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1



ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #2

PART I

A. 2

B. 2

C. 1

D. 2

PART II

A. A vacuum has formed in the glass container due to the use of a nonvented tubing

B. Insert a needle airway into the container beside the tubing spike

C. Change the tubing to a vented tubing

D. Restart IV and document

EQUIPMENT AND SUPPLIES
UNIT VI

JOB SHEET #1--SPIKE AN IV CONTAINER AND FILL STRAIGHT TUBING

I. Equipment and supplies

A. Appropriate IV solution

B. Straight IV tubing

C. Alcohol sponges

D. IV pole

II. Procedure

A. Select appropriate IV solution as verified by communication tool

B. Examine solution and container

C. Check expiration date

D. Obtain equipment and take to room

E. Wash hands

F. Set up IV pole in appropriate place on bed or at bedside

G. Open packaging containing IV tubing

H. Remove tubing; move flow-control clamp up under drip chamber and close

I. If using glass or plastic bottle, set on firm surface and remove protective cap from spike port

(NOTE: When using a vented glass bottle, be sure to remove the rubber diaphragm covering the spike port.)

J. If using plastic bag, suspend from IV pole and remove protective cap from spike port

K. Cleanse spike port of glass bottle thoroughly with alcohol sponges

L. Remove plastic protective cap covering spike of tubing

(CAUTION: Carefully avoid touch contamination.)

M. Use straight thrust to insert tubing spike into spike port of container

(NOTE: The use of a twisting motion might enlarge the spike port of the container and allow the entrance of contaminants.)

JOB SHEET #1

N. Squeeze drip chamber of tubing and fill at least one-half full

O. Open flow-control clamp and allow fluid to completely fill tubing

(CAUTION: Some tubings will require the removal of the distal protective cap to fill tubing. This cap must be kept sterile and reapplied after the tubing has filled. Carefully avoid touch contamination. The Travenol tubing has cotton in the distal protective cap, and care must be taken to prevent wetting this cotton.)

P. Close flow-control clamp

Q. Wash hands before leaving room

EQUIPMENT AND SUPPLIES
UNIT VI

JOB SHEET #2--FILL TUBING CONTAINING MULTIPLE SECONDARY PORTS

I. Equipment and supplies

A. Appropriate IV solution

B. IV tubing with multiple secondary ports

C. Alcohol sponges

D. IV pole

II. Procedure

A. Select appropriate IV solution as verified by communication tool

B. Examine solution and container

C. Check expiration date

D. Obtain equipment and take to room

E. Wash hands

F. Set up IV pole in appropriate place on bed or at bedside

G. Open packaging containing IV tubing

H. Remove tubing; move flow-control clamp up under drip chamber and close

I. If using glass or plastic bottles, set on firm surface and remove protective cap from spike port

(NOTE: When using a vented glass bottle, be sure to remove the rubber diaphragm covering the spike port.)

J. If using plastic bag, suspend from IV pole and remove protective cap from spike port

K. Cleanse spike port of glass bottle thoroughly with alcohol sponges

L. Remove the plastic protective cap covering the spike of the tubing

(CAUTION: Carefully avoid touch contamination.)

M. Use a straight thrust to insert tubing spike into spike port of container

(NOTE: The use of a twisting motion might enlarge the spike port of the container and allow the entrance of contaminants.)

JOB SHEET #2

N. Squeeze drip chamber of tubing and fill at least one-half full

O. Hold tubing so that uppermost secondary port is inverted

P. Open flow-control clamp slowly, allowing solution to fill tubing

Q. As fluid approaches secondary port, gently tap port to expel air bubbles

R. Hold tubing to invert second secondary port

S. As fluid approaches second secondary port, gently tap port to expel air bubbles

T. Fill remainder of tubing

(CAUTION: Some tubings will require the removal of the distal protective cap to fill tubing. This cap must be kept sterile and reapplied after the tubing has filled. Carefully avoid touch contamination. The Travenol tubing has cotton in the distal protective cap, and care must be taken to prevent wetting this cotton.)

U. Close flow-control clamp

V. Wash hands before leaving room

EQUIPMENT AND SUPPLIES
UNIT VI

JOB SHEET #3--FILL TUBING CONTAINING BACK-CHECK VALVE

I. Equipment and supplies

   A. Appropriate IV solution

   B. IV tubing with backcheck valve

   C. Alcohol sponges

   D. IV pole

II. Procedure

   A. Select appropriate IV solution as verified by communication tool

   B. Examine solution and container

   C. Check expiration date

   D. Obtain equipment and take to room

   E. Wash hands

   F. Set up IV pole in appropriate place on bed or at bedside

   G. Open packaging containing IV tubing

   H. Remove tubing; move flow-control clamp up under drip chamber and close

   I. If using glass or plastic bottle, set on firm surface and remove protective cap from spike port

   (NOTE: When using a vented glass bottle, be sure to remove the rubber diaphragm covering the spike port.)

   J. If using plastic bag, suspend from IV pole and remove protective cap from spike port

   K. Cleanse spike port of glass bottle thoroughly with alcohol sponges

   L. Remove plastic protective cap covering spike of tubing

   (CAUTION: Carefully avoid touch contamination.)

   M. Use a straight thrust to insert tubing spike into spike port of container

   (NOTE: The use of a twisting motion might enlarge the spike port of the container and allow the entrance of contaminants.)

JOB SHEET #3

N. Squeeze drip chamber of tubing and fill at least one-half full

O. Hold tubing so that backcheck valve and uppermost secondary port are inverted

P. Open flow control clamp slowly, allowing fluid to fill tubing

Q. As fluid approaches backcheck valve, gently tap backcheck valve housing and secondary port to expel any air bubbles

R. Hold tubing to invert second secondary port

S. As fluid approaches second secondary port, gently tap port to expel air bubbles

T. Fill remainder of tubing

(CAUTION: Some tubings will require the removal of the distal protective cap to fill tubing. This cap must be kept sterile and reapplied after the tubing has filled. Carefully avoid touch contamination. The Travenol tubing has cotton in the distal protective cap, and care must be taken to prevent wetting this cotton.)

U. Close flow-control clamp

V. Wash hands before leaving room

EQUIPMENT AND SUPPLIES
UNIT VI

JOB SHEET #4--FILL TUBING AND FILTER

I. Equipment and supplies

- A. Appropriate IV solution
- B. Appropriate IV tubing with or without filter
- C. Filter, if not built into IV tubing
- D. Alcohol sponges, if using glass bottles
- E. IV pole

II. Procedure

- A. Select appropriate IV solution as verified by communication tool
- B. Examine solution and container
- C. Check expiration date
- D. Obtain equipment and take to room
- E. Wash hands
- F. Set up IV pole in appropriate place on bed or at bedside
- G. Open packaging containing IV tubing
- H. Remove tubing; move flow-control clamp up under drip chamber and close
- I. If using glass or plastic bottle, set on firm surface and remove protective covering from spike port

  (NOTE: When using a vented glass bottle, be sure to remove the rubber diaphragm covering the spike port.)
- J. If using plastic bag, suspend from IV pole and remove protective covering from spike port
- K. Cleanse spike port of glass bottle thoroughly with alcohol sponges
- L. Remove plastic cap covering spike of tubing

  (CAUTION: Carefully avoid touch contamination.)

JOB SHEET #4

M. Use a straight thrust to insert tubing spike into spike port of container

(NOTE: The use of a twisting motion might enlarge the spike port of the container and allow the entrance of contaminants.)

N. Squeeze drip chamber of tubing and fill at least one-half full

O. Connect IV tubing male adapter to female adapter of filter

P. Hold tubing and filter so that filter is inverted

Q. Open flow-control clamp slowly, allowing fluid to fill tubing and filter

R. As fluid begins to fill filter, tap the filter housing to clear air bubbles

S. Fill remaining tubing and close flow-control clamp

(CAUTION: Some tubings will require removal of the distal protective cap to fill tubing. This cap must be kept sterile and reapplied after the tubing has been filled. Carefully avoid touch contamination.)

T. Place distal portion of tubing in a readily accessible area for use after venipuncture

U. Wash hands before leaving room

EQUIPMENT AND SUPPLIES
UNIT VI

JOB SHEET #5--PREPARE WING-TIPPED NEEDLE FOR VENIPUNCTURE

I. Equipment and supplies

- A. Appropriate IV solution
- B. Appropriate IV tubing
- C. Appropriate-sized wing-tipped needle

II. Procedure

(NOTE: These steps must be performed immediately before venipuncture.)

- A. Select appropriate IV solution as verified by communication tool
- B. Examine solution and container
- C. Check expiration date
- D. Obtain equipment and take to room
- E. Wash hands
- F. Spike IV container and fill tubing
- G. Open package containing wing-tipped needle
- H. Remove needle from package and inspect needle for flaws or barbs
- I. Remove male adapter plug from distal female adapter of needle
- J. Remove distal protective cap from IV tubing

  (CAUTION: Carefully avoid touch contamination.)
- K. Insert distal tip of IV tubing into female adapter of needle
- L. Open IV tubing flow-control clamp and slowly fill wing-tipped needle

  (CAUTION: Avoid allowing fluid to drip out of needle tip.)
- M. Close flow-control clamp
- N. Wash hands before leaving room

EQUIPMENT AND SUPPLIES
UNIT VI

JOB SHEET #6--PREPARE WING-TIPPED NEEDLE AS HEPARIN LOCK

I. Equipment and supplies

A. Appropriate-sized wing-tipped intermittent infusion needle

B. 3-ml syringe with 23- or 25-gauge needle

C. Alcohol sponges

D. Vial of normal saline

II. Procedure

A. Obtain equipment and take to room

B. Wash hands

C. Open packaging containing wing-tipped intermittent infusion needle

D. Remove needle from packaging and inspect it for flaws or barbs

E. Fill syringe with normal saline

F. Cleanse intermittent injection cap with alcohol

G. Insert syringe into cap and fill tubing with normal saline

(CAUTION: Avoid allowing fluid to drip out of needle tip.)

H. Leave syringe connected to device

(NOTE: Syringe is left in place to flush the backflow of blood from the device. After this device is inserted and the backflow of blood is flushed from it, it will be taped and then flushed with a dilute heparin solution. This flush solution can be prepared by the nurse to equal 100 units per milliliter. It also comes in prefilled syringes of varying strengths.)

I. Wash hands before leaving room

EQUIPMENT AND SUPPLIES
UNIT VI

JOB SHEET #7--ADMINISTER MEDICATION USING WING-TIPPED HEPARIN LOCK

I. Equipment and supplies

A. Two 3-milliliter syringes filled with normal saline; equipped with 23-or 25-gauge needle

B. One syringe containing at least 1 milliliter of heparin flush solution

(CAUTION: Carefully check the strength of the heparin flush solution. Common strengths vary from 10 to 100 units per mililiter.)

C. Syringe or partial-fill container with tubing containing medication

D. Alcohol sponges

II. Procedure

A. Obtain equipment and take to room

B. Wash hands

C. Identify patient, using appropriate communication tool

D. Identify yourself to patient and/or family and explain procedure

E. Assemble equipment at bedside for easy accessibility

F. Visually inspect the site

(NOTE: You will want to check for a raised, blanched area that may feel cool to touch; redness that may feel warmer than surrounding tissue; or leakage around site.)

(CAUTION: If any of the above signs are found, the device must be removed and a new needle inserted.)

G. Cleanse intermittent injection cap with alcohol sponge

H. Insert one of the normal saline-filled syringes into the injection cap

(CAUTION: A small-gauged needle must always be used to avoid damaging the injection cap.)

JOB SHEET #7

I. Attempt to aspirate blood

(NOTE: Aspirate blood to assure that the needle is in the vein. If blood cannot be aspirated, check for kinks in the tubing. If no kinks are found, untape the device and elevate the wings slightly and then try aspiration. When using an over-the-needle catheter, check for kinks in the catheter where it enters the skin.)

(CAUTION: If the blood cannot be aspirated after checking all of the above, device must be removed and a new heparin lock must be inserted. DO NOT inject normal saline!)

J. Inject 2 milliliters of normal saline when assured that device is in vein

(NOTE: Normal saline is used to flush the heparin solution through the device to avoid any possible incompatibilities.)

(CAUTION: To avoid possible heparinization of the patient, some institutions require aspiration of the heparin flush solution, instead of flushing.)

K. Remove syringe from needle, leaving needle in injection cap; discard syringe

(NOTE: Leaving the needle in the injection cap prevents multiple punctures and damage to the injection cap.)

(CAUTION: Carefully avoid touch contamination.)

L. Attach medication syringe or IV tubing to needle

M. Infuse medication properly

N. Remove medication syringe or IV tubing from needle after administration of a medication is complete, leaving needle in injection cap; discard syringe or IV tubing

O. Attach normal saline-filled syringe to needle in injection cap and inject 2 milliliters

(NOTE: Injection of normal saline assures that all of the medication is removed from the device to avoid any possible incompatibilities.)

P. Remove syringe, leaving needle in injection cap; discard syringe

Q. Attach syringe containing heparin flush solution to injection cap; inject 1 milliliter of this solution

(NOTE: If the solution is in a prefilled syringe, the needle in the injection cap will have to be removed, the cap cleansed with alcohol, and the new syringe attached.)

R. Remove syringe and needle; discard appropriately

S. Wash hands before leaving room

EQUIPMENT AND SUPPLIES
UNIT VI

TEST

NAME ______________________________________ SCORE _________________

1. Match terms associated with equipment and supplies to their correct definitions. Write the correct numbers in the blanks. Terms and definitions are continued on the following page.

_____ a. So fine in texture as to be seen through

_____ b. To push with sudden force

_____ c. Connection that fits over male adapter

_____ d. To obstruct; impede

_____ e. Obtainable; easily reached

_____ f. Space exhausted of its fluid and/or air content

_____ g. Device for straining out impurities

_____ h. Having unmistakable characteristics

_____ i. Opening

_____ j. Quantity or amount of occupied space

_____ k. Consisting of or abounding in irregular bends or turns; twisting

_____ l. Tiny openings through which fluids may pass

_____ m. To make impure or unclean

_____ n. To withdraw fluids or gases by suction

_____ o. One thousandth of a liter

_____ p. Slender metal device used to stiffen a catheter

_____ q. Together at the same time

_____ r. Inactive; having few or no active properties

_____ s. Away from the point of attachment

_____ t. To slip by; pass

1. Distinctive
2. Milliliter (ml)
3. Elapse
4. Volume
5. Simultaneous
6. Tortuous
7. Thrust
8. Vacuum
9. Contaminate
10. Transparent
11. Female adapter
12. Clog
13. Filter
14. Accessible
15. Inert
16. Pores
17. Port
18. Stylet
19. Aspirate
20. Distal

TEST

______u. Thin, soft, pliable layer that covers or lines a body part

______v. Stopping and starting again at intervals

______w. Connection that fits inside female adapter

______x. One millionth of a meter; one thousandth of a millimeter

______y. Small opening to permit passage or escape of a gas

______z. To force out

______aa. Shelter; covering

______bb. First in importance

______cc. Minute, separate pieces of material

______dd. To turn upside down

______ee. Sharp, pointed projection

______ff. Dealing with the physical characteristics of plants and animals

______gg. A measure; dimension

______hh. To shrink together; to cave in

______ii. Sticky; thick in texture

21. Intermittent
22. Membrane
23. Collapse
24. Micron
25. Spike
26. Vent
27. Invert
28. Housing
29. Expel
30. Male adapter
31. Primary
32. Viscous
33. Particulate matter
34. Biologic
35. Gauge

2. Match types of IV tubing drip systems to their correct descriptions. Write the correct numbers in the blanks. Numbers may be used more than once.

______a. Forms very small drop

______b. Can deliver different drip rates per milliliter due to different-sized drops

______c. May also be called *minidrip* or *pediatric infusion set*

______d. Is called *infusion set*

______e. Delivers 60 drops per milliliter

______f. Has a distinctive metal tip where drop is formed

1. Microdrip
2. Macrodrip

TEST

3. Distinguish among characteristics of microdrip and macrodrip IV tubing systems. Write the correct numbers in the blanks. Numbers may be used more than once.

______a. Helps prevent accidental overload

______b. Can deliver very large volumes in a very short time

______c. Can deliver very small amounts over a long period of time

______d. Requires use of formula to calculate rate of drops per minute and flow rate

______e. Can deliver large volumes in a relatively short time

______f. Simplifies counting out and setting flow rate

1. Microdrip

2. Macrodrip

4. Discuss IV tubing containing multiple secondary ports.

5. Discuss IV tubing containing backcheck valves.

6. Distinguish among characteristics of vented and nonvented IV tubings. Write a "V" before characteristics of vented tubing and an "N" before characteristics of nonvented tubing. Some blanks may contain more than one answer.

______a. May contain multiple secondary ports and/or backcheck valve

______b. Is a closed system with no opening

TEST

______c. May also be used with any container

______d. Must be used with nonvented glass bottles

______e. Has filtered opening to allow air to enter system

______f. Consists of a straight IV tubing with either type drip system

______g. May be used with vented glass bottle, plastic bag, or plastic bottle

7. Match types of clamps to their correct uses. Write the correct numbers in the blanks.

______a. Used to regulate flow rate; is turned clockwise to open line and counterclockwise to close line

______b. Used to turn IV on or off; tubing is slid into wide opening to turn IV on or into narrow opening to turn IV off

______c. Used to regulate flow rate; thumb is used to move roller up to open line or down to close line

1. Roller
2. Screw
3. Slide

8. Select from the following list characteristics of terminal filtering devices. Write an "X" in the blank before each correct answer.

______a. May contain secondary ports

______b. Must be changed when they become discolored

______c. Should be placed in line just below drip chamber

______d. Are used to remove particulate matter and contaminants such as bacteria and to eliminate air above filter

______e. Consist of a transparent filter housing and membrane filter

______f. Are always a built-in part of the IV tubing

______g. Have slide clamp to temporarily turn off flow of solution

______h. Cannot be used when medications are to be infused

______i. Contain filter element of biologically inert membrane with spongelike interlocking pores

______j. May be built into IV tubing

______k. Are long and round in appearance

______l. Have range of porosities from 0.22 microns to 3.5 microns

TEST

______m. Are made by only one manufacturer

______n. May be a separate unit to be added to tubing

______o. Are used only for hyperalimentation

______p. Come in many different sizes and types

9. List points to consider when using a filtering device.

a. ____

____

b. ____

____

c. ____

____

d. ____

____

e. ____

____

f. ____

____

g. ____

____

10. Distinguish among characteristics of basic IV needles and catheters. Write the correct numbers in the blanks. Numbers may be used more than once.

______a. Consists of a 1/2-inch to 3-inch plastic catheter attached to a rigid hub

______b. Can be either a wing-tipped needle or an over-the-needle catheter

______c. Needle or stylet fits inside plastic catheter to facilitate entry through skin and into vein

______d. Consists of a short steel needle

1. Wing-tipped needle
2. Over-the-needle catheter (ONC)
3. Heparin lock

TEST

_____e. Has an intermittent injection cap inserted in female adapter

_____f. Needle is connected to a flat piece of plastic (wings) and a short piece of plastic tubing with a plastic female adapter

11. Match types of IV needles and catheters to their correct uses. Write the correct numbers in the blanks. Numbers may be used more than once. Some blanks may contain more than one answer.

_____a. Delivery of viscous liquids

_____b. As a heparin lock

_____c. To provide route to give IV medications intermittently without using continuously running IV fluids

_____d. Infants and children

_____e. Arterial monitoring

_____f. Short-term IV therapy--less than twenty-four hours

_____g. To provide route to give emergency IV medications without using continuously running IV fluids

_____h. Long-term therapy--over twenty four hours

_____i. Elderly patients or adults with small and/or tortuous veins

1. Wing-tipped needle
2. Over-the-needle catheter
3. Heparin lock

12. Distinguish among advantages and disadvantages of basic IV needles and catheters. Write the correct numbers in the blanks. Numbers may be used more than once. Some blanks may contain more than one answer.

1. Wing-tipped needle
2. Over-the-needle catheter
3. Wing-tipped herapin lock
4. Over-the-needle catheter heparin lock

a. Advantages

_____1) Is inserted by nurse

_____2) Allows needle (stylet) to be completely removed after insertion

_____3) Is less likely to puncture the vein and infiltrate because of flexible plastic

TEST

_____4) Is more comfortable

_____5) Reduces touch contamination

_____6) Prevents risk of accidental fluid overload

_____7) Is simple and easy to use

_____8) Allows patient greater mobility because of its stability

_____9) Is less painful upon insertion

_____10) Permits conversion of existing venipuncture to a heparin lock by use of intermittent injection cap with ONC in place

_____11) Is less likely to trigger mechanical phlebitis

_____12) Reduces risk of complications of long-term IV therapy

_____13) Allows greater patient mobility

b. Disadvantages

_____1) Is prone to touch contamination

_____2) Is less stable

_____3) Is less stable than ONC

_____4) Is more likely to damage vein during insertion

_____5) Is unsuitable for infusing highly viscous liquids

_____6) Is likely to trigger a mechanical phlebitis

_____7) Is unsuitable for long-term therapy

_____8) Can support infection

_____9) Must be flushed before and after administering medication

_____10) Can puncture vein and tends to infiltrate more easily because of inflexible needle point

_____11) Must be flushed with heparin solution at intervals

13. Select from the following list criteria for choosing the right type and size of needle or catheter. Write an "X" in the blank before each correct answer.

_____a. Always select largest size possible

_____b. Consider size of patient and size of vein to be used

_____c. Consider insertion site

TEST

_____d. Type of fluid makes no difference

_____e. Choose smallest size possible for required therapy

_____f. Consider type fluid to be given

_____g. Use wing-tipped needles for the elderly

_____h. Consider length of therapy

_____i. Consider age of patient

(NOTE: Test questions 14 and 15 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

14. Analyze the use of tubings and containers.

15. Demonstrate the ability to

    a. Spike an IV container and fill straight tubing.

    b. Fill tubing containing multiple secondary ports.

    c. Fill tubing containing backcheck valve.

    d. Fill tubing and filter.

    e. Prepare wing-tipped needle for venipuncture.

    f. Prepare wing-tipped needle as heparin lock.

    g. Administer medication using wing-tipped heparin lock.

EQUIPMENT AND SUPPLIES
UNIT VI

ANSWERS TO TEST

1. a. 10
b. 7
c. 11
d. 12
e. 14
f. 8
g. 13
h. 1
i. 17
j. 4
k. 6
l. 16
m. 9
n. 19
o. 2
p. 18
q. 5
r. 15
s. 20
t. 3
u. 22
v. 21
w. 30
x. 24
y. 26
z. 29
aa. 28
bb. 31
cc. 33
dd. 27
ee. 25
ff. 34
gg. 35
hh. 23
ii. 32

2. a. 1
b. 2
c. 1
d. 2
e. 1
f. 1

3. a. 1
b. 2
c. 1
d. 2
e. 1
f. 1

4. Discussion should include the following
a. Consists of straight tubing with more than one secondary port
b. Can have either type drip system

ANSWERS TO TEST

c. Can be used when administering multiple IV piggyback medications

d. Allows main IV solution and piggyback solution to run simultaneously

e. Is useful when both IV piggyback and IV push medications are ordered

5. Discussion should include the following

a. Contains multiple secondary ports

b. Allows only one solution at a time to flow

c. Requires a short secondary IV tubing for infusion of medications

d. Can be used when administering multiple IV piggyback medications

6. a. N, V

b. N

c. V

d. V

e. V

f. N, V

g. N

7. a. 2

b. 3

c. 1

8. a, d, e, g, i, j, l, n, p

9. a. Risk of phlebitis is reduced

b. Correct-sized pore must be chosen to allow prescribed solution to infuse

c. Discoloration by particulate matter is sometimes seen in filter

d. Highly viscous fluids must be piggybacked below the filter

e. Medication must be properly dissolved before infusing

f. Filter must be changed every twenty-four hours

g. Filter is usually placed in the line below the pump when used with an infusion pump

ANSWERS TO TEST

10.

a.	2	d.	1
b.	3	e.	3
c.	2	f.	1

11.

a.	2	f.	1
b.	1, 2	g.	3
c.	3	h.	2
d.	1	i.	1
e.	2		

12.

a.	1)	1, 2	b.	1)	2,4
	2)	2, 4		2)	1
	3)	2, 4		3)	3
	4)	3, 4		4)	2, 4
	5)	1, 3		5)	1
	6)	3, 4		6)	2, 4
	7)	1		7)	1
	8)	2, 4		8)	2, 4
	9)	1, 3		9)	3, 4
	10)	4		10)	1, 3
	11)	1		11)	3, 4
	12)	3			
	13)	3			

13. b, c, e, f, h, i

14. Evaluated to the satisfaction of the instructor

15. Performance skills evaluated to the satisfaction of the instructor

ACCESSORY EQUIPMENT
UNIT VII

UNIT OBJECTIVE

After completing this unit, the student should be able to use different types of piggyback systems, volume control devices, and extension tubes. The student should also be able to distinguish among the different types of infusion pumps and their principles of use. This knowledge will be shown by completing assignment sheets, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with piggyback systems to their correct definitions.
2. Discuss types of piggyback systems.
3. Match terms associated with volume control devices to their correct definitions.
4. Select from a list characteristics of volume control devices.
5. Describe types of volume control devices.
6. List uses for volume control devices.
7. Match terms associated with infusion pumps to their correct definitions.
8. Discuss the advantages and disadvantages of infusion pumps.
9. Distinguish among characteristics of infusion pump delivery systems.
10. Distinguish among advantages and disadvantages of types of infusion pumps.
11. List special features of infusion pumps.
12. List nursing responsibilities and interventions with regard to infusion pumps.
13. Discuss extension tubing.
14. Demonstrate the ability to
    a. Set up piggyback administration set into secondary port.
    b. Lower container to remove air from secondary tubing.

OBJECTIVE SHEET

c. Direct air into drip chamber to remove air from secondary tubing.

d. Use needle to remove air from secondary tubing.

e. Roll tubing around pen or pencil to remove air from secondary tubing.

f. Set up piggyback administration set into backcheck valve.

g. Flush secondary tubing between medications--backcheck valve.

ACCESSORY EQUIPMENT
UNIT VII

SUGGESTED ACTIVITIES

I. Suggested activities

A. Obtain equipment to supplement unit.

1. Two IV tubings with multiple secondary ports for each student

2. One IV tubing with backcheck valve for each student

3. Two solution containers of any type for each student

   (NOTE: These containers may be reused only after use on artificial arms.)

   (CAUTION: For use on artificial arms, the IV containers must be emptied of solution and then rinsed and refilled with distilled water.)

4. Two partial-fill solution containers of any type for each student

5. At least two #18 and #20 needles for each student

6. Alcohol sponges

7. At least four packages of gauze 4x4s for each student

8. Examples of the following if budget permits

   a. Floating valve filter volume control device

      EXAMPLE: Abbott

   b. Membrane filter

      EXAMPLE: Travenol

   c. Extension tubing

9. One IV pole for each artificial arm

10. Two small, shallow, open containers for each artificial arm

    EXAMPLE: Emesis basins

    (NOTE: These containers are to be used as a receptacle to catch IV solution from the arm outlet tubing and as the container for the distilled water to be used as the prep agent for the arms.)

SUGGESTED ACTIVITIES

11. At least two towels or other absorbent material for each arm

    (NOTE: Toweling is to be used to wipe up any spills and to be placed under each artificial arm.)

12. Flat surface for arms

    (NOTE: This surface should be of sufficient height for comfort while performing venipuncture.)

B. Pretest students to assess their present knowledge of the subject.

C. Provide students with objective sheet.

D. Provide students with information, assignment, and job sheets.

E. Discuss unit and specific objectives.

F. Discuss information sheet.

G. Show examples of volume control sets and extension tubing as they are discussed.

H. Individualize instruction for students with special needs.

I. Discuss assignment sheets.

J. Set up arms.

K. Lay out equipment for ease of use.

L. Demonstrate and discuss procedures outlined in job sheets.

M. Give test.

N. Discuss test.

O. Reteach if necessary.

II. Instructional materials

A. Objective sheet

B. Suggested activities

C. Information sheet

D. Assignment sheets

1. Assignment Sheet #1--Distinguish Between Advantages and Disadvantages of Different Types of Infusion Pumps

2. Assignment Sheet #2--Complete Accessory Equipment Crossword Puzzles

SUGGESTED ACTIVITIES

E. Answers to assignment sheets

F. Job sheets

1. Job Sheet #1--Set Up Piggyback Administration Set into Secondary Port
2. Job Sheet #2--Lower Container to Remove Air from Secondary Tubing
3. Job Sheet #3--Direct Air into Drip Chamber to Remove Air from Secondary Tubing
4. Job Sheet #4--Use Needle to Remove Air from Secondary Tubing
5. Job Sheet #5--Roll Tubing Around Pen or Pencil to Remove Air from Secondary Tubing
6. Job Sheet #6--Set Up Piggyback Administration Set into Backcheck Valve
7. Job Sheet #7--Flush Secondary Tubing Between Medications--Backcheck Valve

G. Test

H. Answers to test

III. Unit references

A. Beaumont, Estelle. "The New IV Infusion Pumps." *Nursing77*, Vol. 7, Number 7 (July, 1977), pp. 31-35.

B. Cohen, Michael R. "Medication Errors: Confirm Your Patient's Identity Before Administering Medications." *Nursing80*, Vol. 10, Number 2 (February, 1980), p. 17.

C. Cohen, Michael R. "Medication Errors: Label IV Bags as Soon as You Add Medications to Them." *Nursing79*, Vol. 9, Number 11 (November, 1979), p 22.

D. Plumer, Ada L. *Principles and Practices of IV Therapy*, 2nd ed. Boston: Little, Brown and Co., 1970.

E. Sager, Diane Proctor, and Suzanne Kovaronvic Bomar. *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management.* Philadelphia: J.B. Lippincott Co., 1980.

F. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary*, 14th ed. Philadelphia: F.A. Davis Co., 1981.

G. West, Richard Samuel, ed. *Managing IV Therapy, Nursing Photobook*. Horsham, Pennsylvania: Intermed Communications Inc., 1980.

H. Woodland, Carolyn. "How to Make Infusion Control Devices Work for You (Instead of Vice Versa)." *RN*, Vol. 44, Number 11 (November, 1981), pp. 58-63.

ACCESSORY EQUIPMENT
UNIT VII

INFORMATION SHEET

I. Terms and definitions associated with piggyback systems (Assignment Sheet #2)

A. Accuracy--Precision; state of being accurate

B. Additive--Substance added to another

C. Contaminant--Substance that makes something impure

D. Convert--To change

E. Exert--To apply pressure

F. Incompatibility--Not suitable for use together

G. Infuse--To introduce a liquid substance into the body

H. Kinked--Twisted, curled, or bent

I. Milliliter (ml)--One thousandth of a liter

J. Simultaneously--At the same time

K. Stationary--Not moving; fixed

L. Valve--Membrane or device that permits fluids to flow in one direction only

M. Viscosity--Heavy, sticky, fluid consistency; offers resistance to flow

N. Infusion pump--Electronic device that automatically delivers IV fluids at preselected flow rates with great accuracy

INFORMATION SHEET

II. Types of piggyback systems

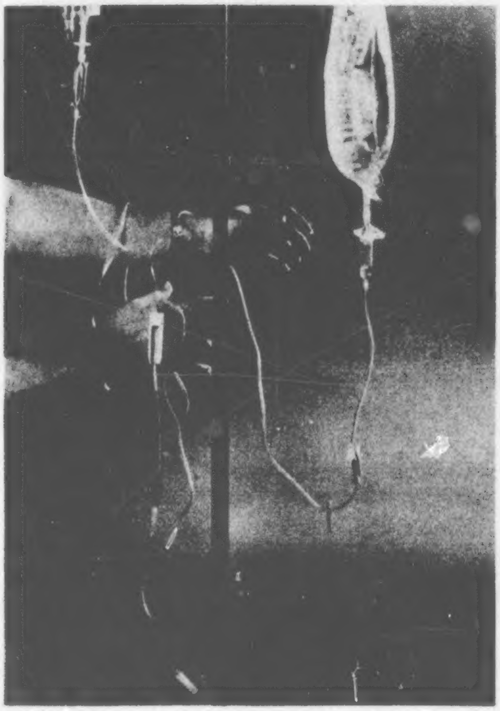
(NOTE: The term *piggyback* refers to the addition of an extra IV tubing, by needle, into the main IV tubing. This system is used to infuse medication or extra fluids.)

A. Regular straight tubing as a secondary tubing into a secondary port (Figure 1; Job Sheets #1-#5)

(NOTE: All connections must be taped to avoid possible accidental separation.)

EXAMPLE:

FIGURE 1



1. Both piggyback solution and main solution can infuse simultaneously

   (NOTE: The compatibility of the main solution and any additives must be checked before the piggyback medication or solution is infused.)

2. Separate tubings must be used for each medication to avoid possible incompatibilities

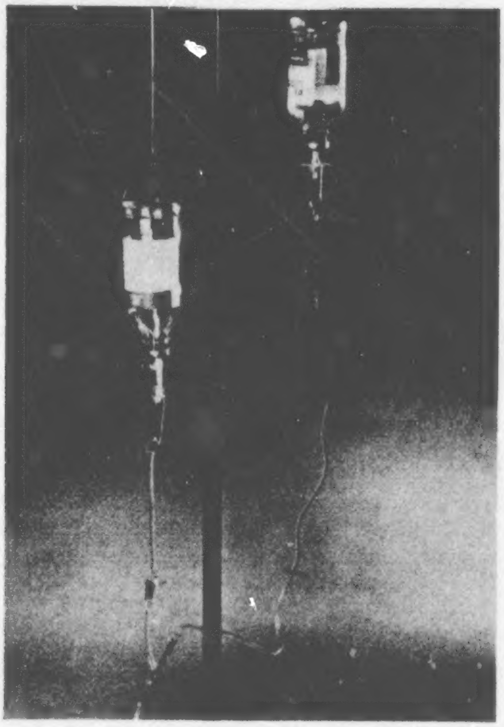
   (NOTE: Any tubing added to the main tubing must be left in place and changed only when the main IV tubing is changed. Each time the line is entered, there is the possibility of introducing contaminants.)

INFORMATION SHEET

B. Short secondary tubing into secondary port opposite a backcheck valve (Figure 2; Job Sheet #6)

EXAMPLE:

FIGURE 2



1. Only one solution will infuse at a time

   (NOTE: Closing of valve occurs automatically when flow-control clamp on piggyback line is opened. Main IV solution flow is then stopped. When piggyback solution is completely infused, valve automatically opens allowing flow of main IV solution to resume.)

   (CAUTION: The infusion rate of both solutions is controlled by the main flow-control clamp. If the rate is changed for infusion of piggyback solution, the rate must be reset to prescribed infusion rate of main IV solution.)

INFORMATION SHEET

2. Same tubing is used for each medication

   (NOTE: This tubing should be left attached to main IV tubing and changed only when main tubing is changed. Line must be taped in place to prevent accidental separation.)

   (CAUTION: Great care must be taken to flush short IV line between medications to avoid possible incompatibilities.)

3. Main IV solution must be hung lower than piggyback solution

   (NOTE: This position allows the force of gravity to exert pressure on the valve to make it open and close.)

4. Secondary tubing must be flushed between medications (Job Sheet #7)

   (NOTE: To empty residual medication from secondary tubing, pinch main IV tubing shut with fingers above back-check valve. As soon as the fluid reaches the end of the secondary tubing, release main tubing. The tubing is now ready to flush.)

   (CAUTION: Be careful not to let air enter main IV tubing from secondary tubing.)

III. Terms and definitions associated with volume control devices (Assignment Sheet #2)

A. Chamber--Enclosed space

B. Device--Mechanical contrivance

C. Filter--Device for straining out impurities

D. Flush--To clean or empty by flow of solution

E. Hinge--Joint on which something swings

F. Increment--Increase or addition in number, size, or volume

G. Membrane--Thin, soft, pliable tissue layer that covers or lines a body part

H. Pore--Tiny opening through which fluids may pass

I. Port--Opening

J. Priming--Making ready; preparing

K. Rupture--To break; burst

L. Vent--Small opening permitting passage or escape of gas

M. Volume--Quantity or amount of occupied space

INFORMATION SHEET

IV. Characteristics of volume control devices

A. Consist of IV tubing, fluid chamber, and IV tubing containing at least one secondary port

B. Contain two clamps, one above and one below fluid chamber

C. Volume of fluid held by chamber varies by manufacturer from 100 milliliters to 200 milliliters

D. Chamber marked in 1 milliliter increments

E. Priming and filling procedures vary by manufacturer

(NOTE: Follow manufacturer's printed packaging instructions very carefully when setting up these devices.)

F. Contain a device in chamber that closes off when chamber is empty

(NOTE: This device prevents air from entering the tubing.)

G. Contain a port for additives

(NOTE: The port is located on the top of the set and is covered by a rubber stopper.)

H. Contain an air vent

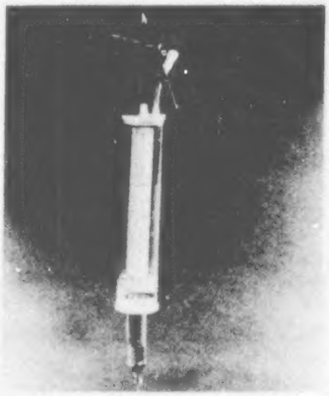
(NOTE: The air vent is on the top of the device and contains some type of filter.)

V. Types of volume control devices

A. Floating valve filter (Figure 3)

EXAMPLE:

FIGURE 3



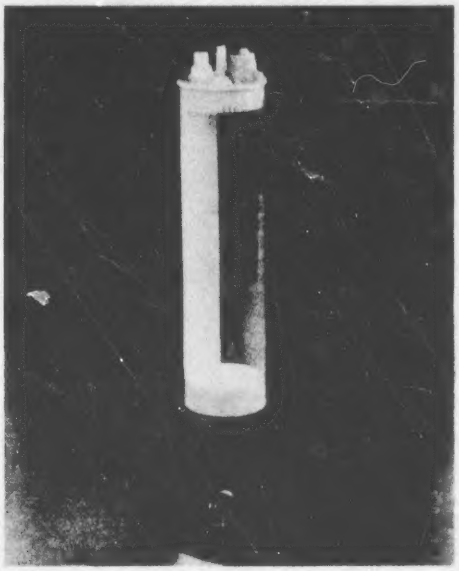
INFORMATION SHEET

1. Consists of a chamber with a valve on a hinge
2. Hinge allows valve to move up and down with changes in chamber's fluid level
3. Closes off drip chamber when fluid chamber is empty

B. Membrane filter (Figure 4)

EXAMPLE:

FIGURE 4



1. Valve remains rigid and stationary at bottom of fluid chamber
2. Closes off drip chamber when fluid chamber is empty

(CAUTION: If this device is primed and filled incorrectly, the membrane can be ruptured and air will enter the drip chamber and tubing.)

VI. Uses for volume control devices

A. Precise control over fluid volume in high-risk patients

EXAMPLES: Infants and children, adults with cardiovascular and/or renal disease

B. Infusion of medications

(NOTE: These devices can be used as the main IV tubing, or they may be piggybacked into the main tubing.)

(CAUTION: These devices must be rinsed with the main IV solution between medications to avoid incompatibilities.)

INFORMATION SHEET

VII. Terms and definitions associated with infusion pumps (Assignment Sheet #2)

A. Activate--To make active or functioning

B. Audible--Loud enough to be heard

C. Cycle--Period of time within which a round of regularly recurring events is completed

D. Cylinder--Anything hollow or solid with a long, round shape

E. Detector--Device used to discover a problem

F. Device--Mechanical contrivance

G. Infusion pump--Electronic device that automatically delivers IV fluids at preselected flow rates with great accuracy

(NOTE: The accuracy of this device is much greater than that of a nurse using a gravity flow with flow-control clamp.)

H. Linear--Pertaining to a line or lines; resembling a line

I. Micron--One millionth of a meter; one thousandth of a millimeter

J. Occlusion--Closure or blockage

K. Opaque--Not letting light pass through

L. Peristalsis--Wavelike contractions and dilation of tubing walls that move contents onward

M. Piston--Disc closely fitted in a hollow cylinder; moved by a rod to exert pressure on fluid in cylinder

N. Pressure--Force exerted against an opposing body; expressed in weight per unit of area

O. Rotary--Turning around a central point

P. Sensor--Device that receives and transmits impressions

Q. Sequential--In regular order

R. Silastic--Pertaining to inert, synthetic, soft plastic

S. Volumetric--Of or based on the measurement of volume

INFORMATION SHEET

VIII. Advantages and disadvantages of infusion pumps

A. Advantages

1. Have alarms that warn of a problem

2. Can be used with any type of container

3. Can be used with in-line filter

4. Can be used for infusion of other liquids

EXAMPLES: Solutions for closed wound irrigation, nasogastric/gastrostomy feedings, intraarterial infusions

(NOTE: Infusion of opaque liquids may not be possible with some types of pumps.)

B. Disadvantages

1. Are expensive

(NOTE: The expense varies with the type of pump. The volumetric pump is more expensive than the controller. Many manufacturers offer a lease plan.)

EXAMPLES: IVAC controller is approximately $800, IMED volumetric is approximately $1,500.

2. Require relatively large amount of storage space

3. Require in-service time

(NOTE: Nurses should be taught how to set up pump and tubing and how to troubleshoot the pump.)

4. Require extra time to clean following each use

IX. Characteristics of infusion pump delivery systems

A. Controller

1. Delivers infusion by gravity and an electronic drop counter

EXAMPLES: IVAC 230 and 260, IMED 350

2. Regulates by a magnetically activated metal ball valve and drop detector

EXAMPLE: McGaw Epic

3. Flow rate set in drops per minute

(NOTE: Some new models count the volume in the drop and are classified as volumetric pumps.)

INFORMATION SHEET

B. Nonvolumetric (rotary and linear)

1. Delivers infusion by peristaltic movement of tubing and a drop counter

2. Set of rollers attached to a rotating disc move fluid through tubing by alternately squeezing and releasing a section of tubing

   EXAMPLE: IVAC 530--rotary pump

3. Series of fingerlike projections move fluid through tubing by sequentially advancing and retracting

   EXAMPLE: LeBarge 2051--linear

4. Flow rate set in drops per minute

   (NOTE: IVAC 260 flow rate is set in milliliters per hour.)

C. Volumetric

1. Delivers infusion by action of a piston and cylinder

   (NOTE: The cylinder is also called the *pump chamber* or a *cassette.*)

2. Moves fluid by exerting pressure on fluid to push set amount of fluid from cylinder

   (NOTE: This action is much like a plunger pushing fluid out of a syringe. The amount pushed out depends upon the size of the cylinder. In a variation of this pump, the piston does not come in contact with the fluid. The piston pressure is relayed to the fluid in the cylinder by a transfer medium separated from fluid by a rubber diaphragm.)

   EXAMPLES: IMED 922 through 630, Abbott Lifecare, Sigma 500

3. Flow rate set in milliliters per hour

   (NOTE: Flow rate is determined by the size of the cylinder and the frequency of the movement of the piston.)

X. Advantages and disadvantages of types of infusion pumps (Assignment Sheet #1)

A. Controller

1. Advantages

   a. Simple to use

   b. Requires minimal in-service time

   c. Delivers fluid at an even rate

INFORMATION SHEET

   d. Can use regular IV tubing

   e. Less expensive than volumetric

2. Disadvantages

   a. Cannot be used for flow rates below 10 milliliters an hour

   b. Cannot be used for flow rates over 200 milliliters an hour

   c. Cannot be used when venous pressure is high

      EXAMPLES: High blood pressure, any condition that causes elevation of central venous pressure

      (NOTE: The alarm may sound even if the patient leans against, or puts pressure on the arm where the IV is inserted.)

   d. Fluid will infuse at wide-open rate when door is opened

      (CAUTION: The flow-control clamp on the IV tubing must be closed down to set a keep-open rate before the door is opened.)

   e. Viscosity of fluid affects flow rate

      (NOTE: The more viscous the fluid, the more drops per minute must be dialed in to deliver the prescribed amount. Most manufacturers provide a conversion chart for the different types of fluid.)

      EXAMPLE: D_5W versus $D_{25}W$

   f. Sometimes require special administration devices

      EXAMPLE: McGaw Epic 100

   g. Tubing must be changed to deliver flow rates higher than 99 milliliters per hour

      (NOTE: These pumps will deliver up to 99 drops per minute, and thus 99 milliliters per hour using a microdrip tubing. If the prescribed flow rate is over 99 milliliters per hour, a macrodrip tubing must be used and the drop rate converted. A conversion chart for most types of macrodrip tubing is provided by the manufacturer.)

   h. Swinging of container during transport or ambulation can cause alarm to sound

   i. Opaque fluids cannot always be delivered

      EXAMPLE: McGaw Epic, IMED 350

      (CAUTION: Blood and most blood products must not be infused through a controller pump. The exceptions are plasma and albumin.)

INFORMATION SHEET

B. Nonvolumetric

1. Advantages

   a. Simple to use

   b. Requires minimal in-service time

   c. Less expensive than volumetric

   d. Can use regular IV tubing

   e. Delivers low flow rates

      EXAMPLE: Five milliliters per hour

   f. Delivers moderately high flow rates

      EXAMPLE: Up to 399 milliliters per hour

2. Disadvantages

   a. Fluid will infuse at wide-open rate when door is opened

      (CAUTION: The flow-control clamp on the IV tubing must be closed down to set a keep-open rate before door is opened.)

      (NOTE: One pump [McGaw Epic] uses a special tubing with a silastic pump chamber that has a spring-operated "flow trap." This stops the fluid when the door is opened.)

   b. Viscosity of fluid affects flow rate

      (NOTE: The more viscous the fluid, the more drops per minute must be dialed in to deliver the prescribed amount. Most companies provide a conversion chart for the different types of fluid.)

      EXAMPLE: D_5W versus $D_{25}W$

   c. Sometimes requires special administration devices

      EXAMPLE: McGaw Epic

   d. High delivery pressure increases risk of infiltration

      (CAUTION: If used for infusion of drugs that can cause tissue damage, such as Levophed and Dopomine, the IV insertion site must be watched closely.)

INFORMATION SHEET

e. Delivers fluids at an uneven rate

f. Tubing must be changed to deliver flow rates higher than 99 milliliters per hour

(NOTE: These pumps will deliver up to 99 drops per minute, and thus 99 milliliters per hour using a microdrip tubing. If the prescribed flow rate is over 99 milliters per hour, a macrodrip tubing must be used and the drop rate converted. A conversion chart for most types of macrodrip tubing is provided by the manufacturer.)

g. Tubing must be moved up or down 4 to 6 inches once every eight hours on some pumps

(NOTE: This is required to prevent damage to the tubing that comes into contact with the projections on the pump.)

EXAMPLE: IVAC 530

(CAUTION: Blood and most blood products must not be infused through a nonvolumetric pump. The exceptions are plasma and albumin.)

C. Volumetric

1. Advantages

a. Is more accurate than controller or nonvolumetric

(NOTE: Milliliters are a more precise measure than drops.)

b. Delivers fluid at an even rate

c. Delivers low flow rates

d. Delivers high flow rates

(NOTE: These pumps will deliver 299 to 999 milliliters an hour.)

2. Disadvantages

a. Requires special administration tubing

b. Requires more time to fill (prime) tubing and set up pump than is required with controller or nonvolumetric

c. Is expensive

d. Requires more in-service time than controller or nonvolumetric

e. Any air in cylinder can change volume of fluid delivered by each cycle

INFORMATION SHEET

f. Rupture of small pore in line filter may occur with pressure increase

EXAMPLE: Kinked tubing below filter

(NOTE: If filters smaller than 3 microns are used, check patient and equipment frequently.)

(CAUTION: Use only filters recommended by the manufacturer.)

g. High delivery pressure increases risk of infiltration

(CAUTION: If used for the infusion of drugs that can cause tissue damage, such as Levophed and Dopamine, the IV insertion site must be watched closely.)

XI. Special features of infusion pumps

A. Alarms (visible and audible)

(NOTE: Some pumps, such as the IVAC pumps, have one light and alarm. It simply tells you that something is wrong, and then you must systematically check the entire system to find the cause. These pumps shut the flow rate off when the alarm sounds. The newer pumps, such as the IMED and Lifecare, have a digital readout that tells you the specific cause. These shut down to a keep-open rate. Some have an on/off control for the audible tone and have a volume control adjustment for the tone. These alarms can be connected to the nurse call system.)

B. Flow rate settings

(NOTE: Some pumps sound an alarm if the proper flow rate is not being maintained.)

EXAMPLES: Le Barge and Lifecare

C. Meters

(NOTE: Meters show amount of fluid given and/or amount of fluid to be given. These meters can be set for an amount slightly less than the prescribed amount so that the pump will alert you before the container is empty.)

EXAMPLES: IMED, Lifecare

(CAUTION: Both these meters count pump cycles only. If there is a disconnection or leak in the system, the patient will not have actually received the fluid shown on the pump.)

D. Drop sensor

(NOTE: A drop sensor is a photoelectric sensor placed on the drip chamber. If no drops are detected for a built-in period of time, the alarm will sound.)

EXAMPLES: IVAC, Lifecare

INFORMATION SHEET

E. Air detector

EXAMPLES: IMED, Lifecare

F. Infiltration detector

(NOTE: An infiltration detector is a flat rubber pad taped over the IV insertion site. It senses changes in skin temperature.)

EXAMPLE: IVAC

G. Battery

(NOTE: Most of the pump's batteries are rechargable and will operate from one to four hours. The alarm will sound when the battery is low.)

H. Occlusion detector

(NOTE: This detector will cause alarm to sound if the pressure in the tubing exceeds the preset limit built into the pump. Occlusion detectors are found on all pumps.)

EXAMPLES: Alarm sounds for clogged filter, unopened flow-control clamp, or kinked tubing.

XII. Nursing responsibilities and interventions with regard to infusion pumps

(NOTE: The use of the infusion pump does not relieve the nurse of any IV therapy responsibilities.)

A. Learn and understand the characteristics and features of the pump and how it works

B. Explain pump to patient and patient's family

(NOTE: Gear your explanation to the understanding level of the patient.)

C. Enlist patient's cooperation

(NOTE: Instruct the patient not to tamper with any of the buttons or dials, to call if alarm sounds, and to call if leaking is noticed.)

D. Check filter before setting up tubing

(NOTE: Make sure that the manufacturer's directions state that the chosen filter can be used with the infusion pump.)

E. Select the proper administration set

F. Fill tubing and/or cylinder properly

G. Set up pump according to manufacturer's directions

INFORMATION SHEET

H. Monitor flow rate at least once an hour

(NOTE: Check to make sure that the pump is delivering the prescribed volume. The use of a timing strip helps to make quick checks.)

I. Monitor IV site for complications

EXAMPLES: Phlebitis, infiltration

J. Tape all connections

K. Check electrical inspection tag

(NOTE: The pump should be inspected by the engineering department every six months.)

L. Move tubing up or down every eight hours when using peristaltic pump

M. Replace IV container before it is empty

N. Document your actions on chart

EXAMPLES: Patient's understanding of instructions on nurses notes; IV solution on IV sheet or medication sheet; periodical notes of observations of patient and site on nurses notes

XIII. Extension tubing (Figure 5)

A. Added to distal tip of IV tubing

B. Connects to IV needle or catheter

C. Allows greater patient mobility

D. Comes in many different types

(NOTE: These tubings can have many features such as flashbacks and secondary ports, depending upon the manufacturer.)

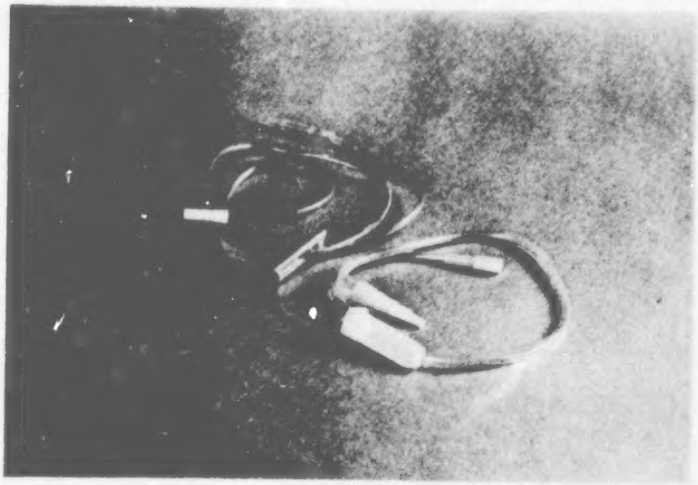
INFORMATION SHEET

E. Varies according to manufacturer

(CAUTION: Great care must be taken to avoid touch contamination when adding this tubing to the main IV tubing.)

EXAMPLE:

FIGURE 5



ACCESSORY EQUIPMENT
UNIT VII

ASSIGNMENT SHEET #1--DISTINGUISH BETWEEN ADVANTAGES AND DISADVANTAGES OF DIFFERENT TYPES OF INFUSION PUMPS

NAME ______________________________ SCORE ______________

This assignment sheet is designed to familiarize you with the different types of infusion pumps and their capabilities, advantages, and disadvantages.

Distinguish between advantages and disadvantages of different types of infusion pumps. Write an "A" in the blank before each advantage; write a "D" in the blank before each disadvantage.

PART I--Controller

_____A. Opaque fluids cannot always be delivered

_____B. Less expensive than volumetric

_____C. Cannot be used for flow rates below 10 milliliters an hour

_____D. Simple to use

_____E. Requires minimal in-service time

_____F. Cannot be used for flow rates over 200 milliliters an hour

_____G. Flow rate is affected by viscosity of fluid

_____H. Can use regular IV tubing

_____I. Delivers fluid at an even rate

_____J. Cannot be used when venous pressure is high

_____K. Sometimes requires special administration devices

_____L. Fluid will infuse at wide-open rate when door is opened

_____M. Tubing must be changed to deliver flow rates higher than 99 milliliters per hour

_____N. Swinging of container during transport or ambulation can cause alarm to sound

PART II--Nonvolumetric

_____A. Delivers moderately high flow rates

_____B. Fluid will infuse at wide-open rate when door is opened

_____C. Tubing must be moved up or down 4 to 6 inches once every eight hours on some pumps

_____D. Simple to use

ASSIGNMENT SHEET #1

_____E. Requires minimal in-service time

_____F. Flow rate is affected by viscosity of fluid

_____G. Can use regular IV tubing

_____H. Delivers low flow rates

_____I. Sometimes requires special administration devices

_____J. Tubing must be changed to deliver flow rates higher than 99 milliliters per hour

_____K. Delivers fluids at an uneven rate

_____L. High delivery pressure increases risk of infiltration

_____M. Less expensive than volumetric

PART III--Volumetric

_____A. Is expensive

_____B. Rupture of small pore filter may occur with pressure increase

_____C. Delivers fluid at an even rate

_____D. Is more accurate than controller or nonvolumetric

_____E. Any air in cylinder can change volume of fluid delivered by each cycle

_____F. Requires special administration device

_____G. Requires more time to fill (prime) tubing and set up pump than is required with controller or nonvolumetric

_____H. Delivers high flow rates

_____I. Requires more in-service time than controller or nonvolumetric

_____J. Delivers low flow rates

_____K. High delivery pressure increases risk of infiltration

ACCESSORY EQUIPMENT
UNIT VII

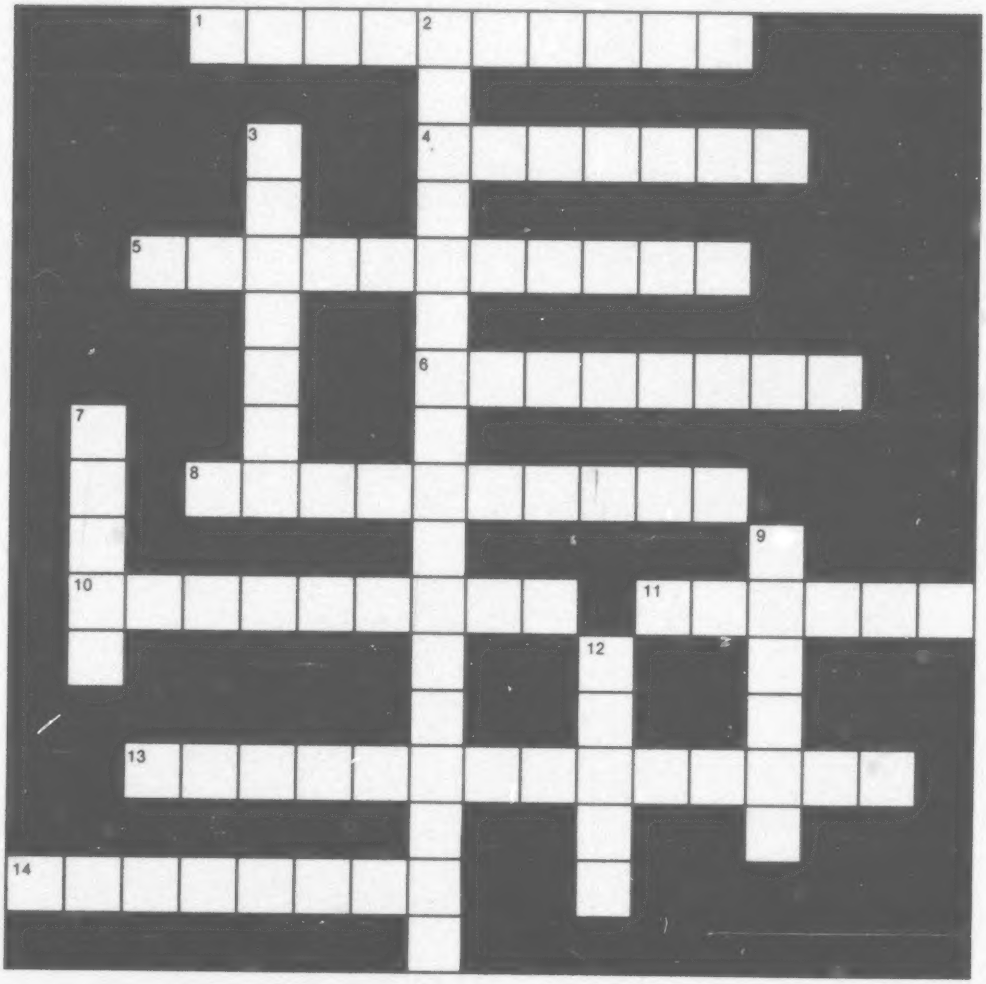
ASSIGNMENT SHEET #2--COMPLETE ACCESSORY EQUIPMENT CROSSWORD PUZZLES

NAME ______________________________ SCORE ______________

This assignment will help familiarize you with terms and definitions associated with IV accessory equipment.

PART I

Complete the piggyback systems crossword puzzle below using the clues on the next page and Section I of your Information Sheet.



ASSIGNMENT SHEET #2

ACROSS

1. One thousandth of a liter
4. A valve will_ _ _ _ _ _ _ _the solution flow
5. Substance that makes something impure
6. Precision; state of being accurate
8. Not moving; fixed
10. Heavy, sticky fluid consistency
11. Twisted, curled, or bent
13. At the same time
14. Substance added to another

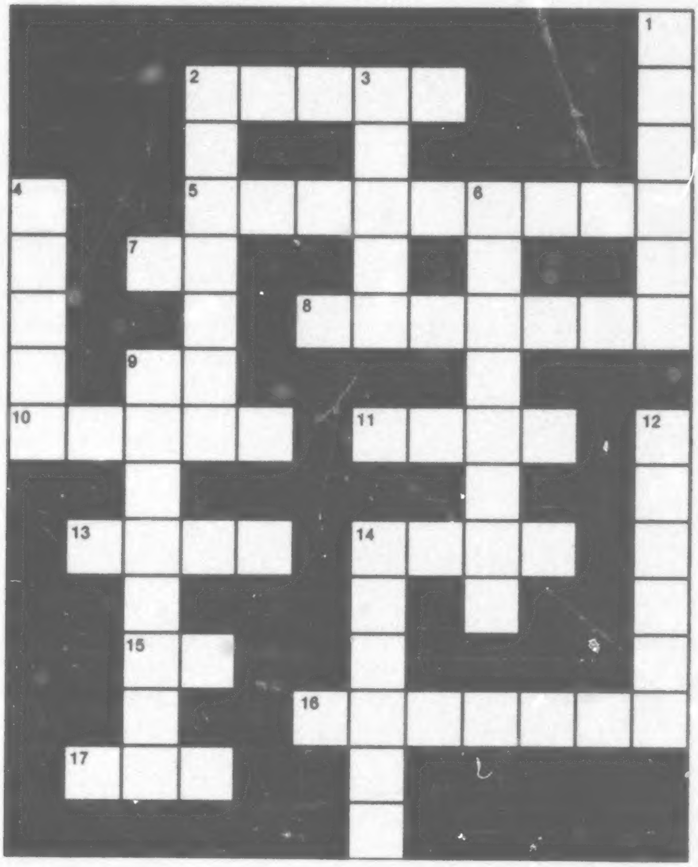
DOWN

2. Not being suitable for use together (plural)
3. To change
7. Membrane or device that permits fluids to flow in one direction only
9. To introduce a liquid substance into the body
12. To apply pressure

ASSIGNMENT SHEET #2

PART II

Complete the volume control devices crossword puzzle below using the clues on the next page and Section III of your Information Sheet.



ASSIGNMENT SHEET #2

ACROSS

2. To make ready; prepare
5. Increase or addition in number, size, or volume
7. Abbreviation for *gram*
8. Enclosed space
9. Opposite of *out*
10. Joint on which something swings
11. Opening
13. Tubing unit
14. Small opening permitting passage or escape of gas
15. Abbreviation for *intravenous*
16. To break; burst
17. Abbreviation for *over-the-needle catheter*

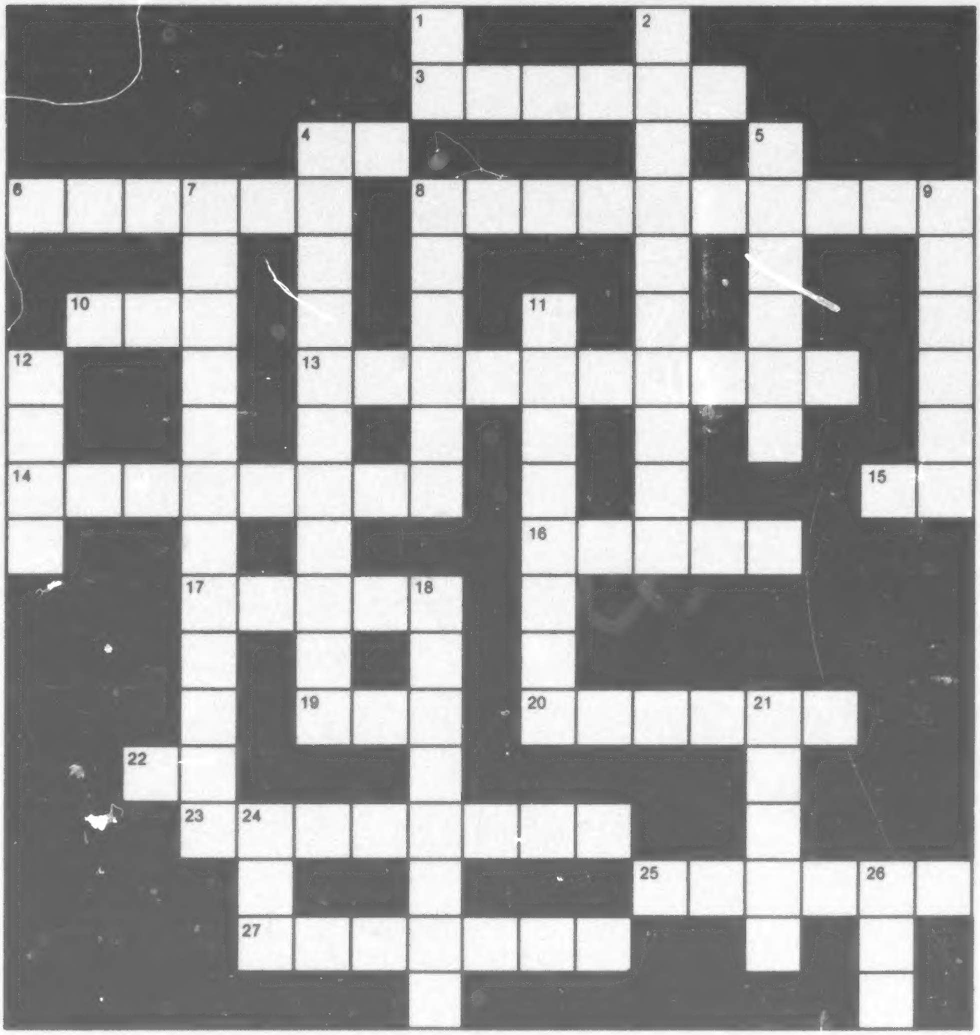
DOWN

2. Making ready; preparing
3. Third month
4. To clean or empty by flow of solution
6. Thin, soft, pliable tissue layer that covers or lines a body part
9. Introduction of liquid substance into the body
12. Mechanical contrivance
14. Quantity or amount of occupied space

ASSIGNMENT SHEET #2

PART III

Complete the infusion pump crossword puzzle below using the clues on the next page and Section II of your Information Sheet.



ASSIGNMENT SHEET #2

ACROSS

3. One millionth of a meter

4. Evening

6. Mechanical contrivance

8. Closures or blockages

10. Opposite of *on*

13. In regular order

14. To make active or functioning

15. Abbreviation for *hour*

16. Period of time within which a round of regularly recurring events is completed

17. Nurses_ _ _ _ _ _ _ _ _; documentation tool

19. Abbreviation for *calorie*

20. Turning around a central point

22. Abbreviation for *gram*

23. Force exerted against an opposing body

25. Disc closely fitted in a hollow cylinder; moved by a rod to exert pressure on fluid in cylinder

27. Loud enough to be heard

DOWN

1. Morning

2. Of or based on the measurement of volume

4. Wavelike contractions and dilation of tubing wall that move contents forward

5. Pertaining to a line or lines; resembling a line

7. Electronic device that automatically delivers IV fluids at preselected flow rates with great accuracy (2 words)

8. Not letting light pass through

9. Device that receives and transmits impressions

11. Device used to discover a problem

12. Brand name for infusion pump

18. Pertaining to inert, synthetic, soft plastic

21. Opposite of *lower*

24. Abbreviation for *Recommended Daily Allowance*

26. Abbreviation for *over-the-needle catheter*

ACCESSORY EQUIPMENT
UNIT VII

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

PART I--Controller

A. D
B. A
C. D
D. A
E. A
F. D
G. D
H. A
I. A
J. D
K. D
L. D
M. D
N. D

PART II--Nonvolumetric

A. A
B. D
C. D
D. A
E. A
F. D
G. A
H. A
I. D
J. D
K. D
L. D
M. A

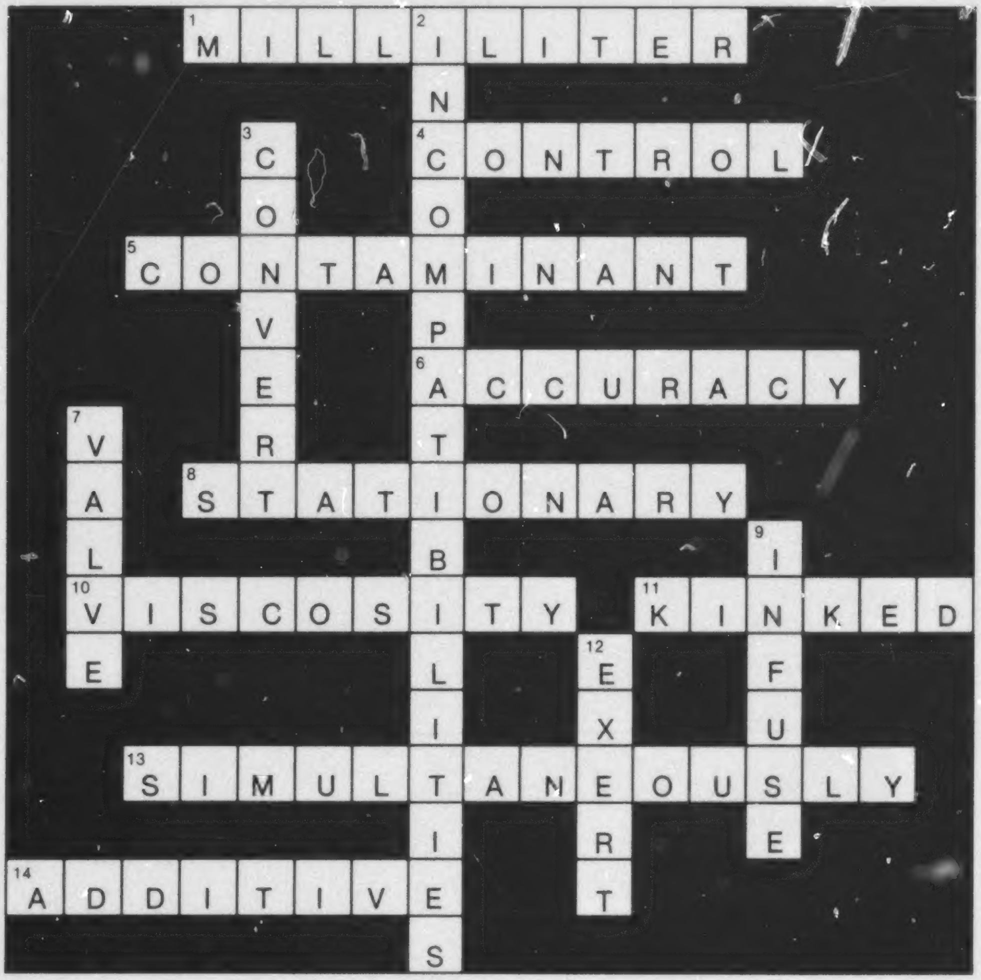
PART III--Volumetric

A. D
B. D
C. A
D. A
E. D
F. D
G. D
H. A
I. D
J. A
K. D

ANSWERS TO ASSIGNMENT SHEETS

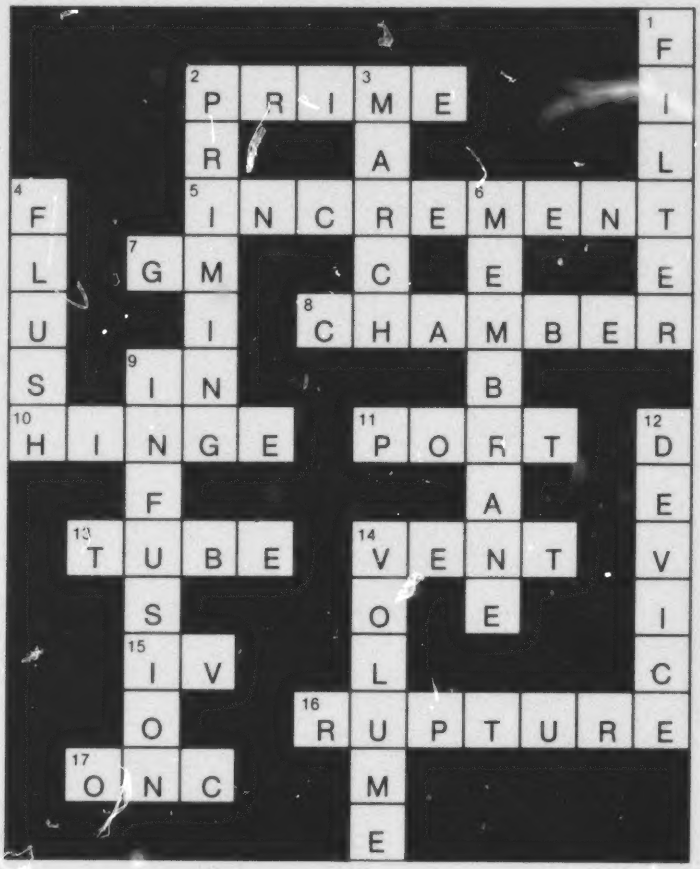
Assignment Sheet #2

PART I



ANSWERS TO ASSIGNMENT SHEETS

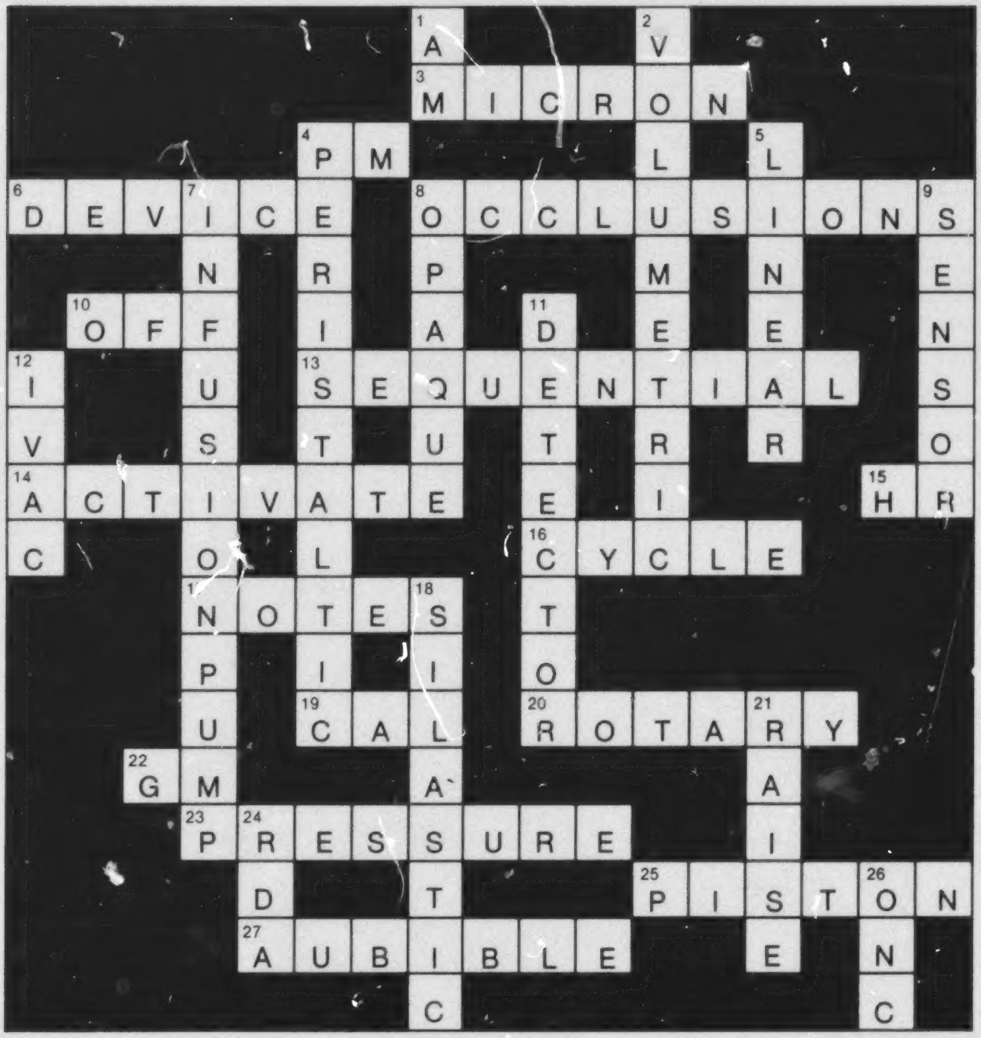
PART II



											1 F
			2 P	R	I	3 M	E				I
			R			A					L
4 F			5 I	N	C	R	E	6 M	E	N	T
L		7 G	M			C		E			E
U			I		8 C	H	A	M	B	E	R
S		9 I	N					B			
10 H	I	N	G	E		11 P	O	R	T		12 D
		F						A			E
	13 T	U	B	E		14 V	E	N	T		V
		S				O		E			I
		15 I	V			L					C
		O			16 R	U	P	T	U	R	E
	17 O	N	C			M					
						E					

ANSWERS TO ASSIGNMENT SHEETS

PART III



ACCESSORY EQUIPMENT
UNIT VII

JOB SHEET #1--SET UP PIGGYBACK ADMINISTRATION SET INTO SECONDARY PORT

I. Equipment

A. To be used in medication room or at patient's nurse server

1. Medication
2. Syringe of appropriate size
3. Needles--#18 and #20 gauge
4. "Medication added" label
5. Diluent if required
6. Alcohol sponges
7. Partial-fill container of appropriate solution

   (NOTE: A partially filled container is a small bag or bottle with 50 milliliters or 100 milliliters IV solution [D_5W or NS] with space for the addition of an extra 50 milliliters or 100 milliliters. It is used basically for the intermittent infusion of medications.)

B. To be used in the patient's room

1. IV tubing--macrodrip or microdrip
2. Alcohol sponges
3. Tape

II. Procedure

(NOTE: Perform steps A-H in the medication room or at the patient's nurse server.)

A. Wash hands

B. Reconstitute medication properly

(NOTE: Many hospitals now have a system in which the pharmacy prepares the medication and sends to the floor a full twenty-four-hour supply. The medication is ready for use in the partial-fill container.)

C. Draw up medication using #18-gauge needle and appropriate size syringe

D. Remove protective covering from spike port of glass containers

E. Cleanse partial-fill container injection port or spike port with alcohol sponge

F. Inject medication into container

JOB SHEET #1

G. Label container properly

(NOTE: Label container immediately after medication is added.)

H. Gently rotate partial-fill container to mix medication and solution thoroughly

I. Take IV tubing, alcohol sponges, and partial-fill container containing medication to patient's room

J. Wash hands

K. Identify yourself to patient and/or family

L. Identify patient

M. Explain procedure to patient

N. Open packaging of secondary tubing and remove tubing

O. Move flow-control clamp up under drip chamber

P. Cleanse spike port of glass container with alcohol sponge

Q. Remove protective cap from spike of secondary tubing

(CAUTION: Carefully avoid touch contamination.)

R. Spike container with secondary tubing

S. Attach #20 gauge needle to secondary IV tubing

T. Suspend container from IV pole

U. Fill (prime) secondary tubing and needle

V. Cleanse chosen secondary port on primary IV tubing with alcohol sponge

W. Remove protective cap from needle

(CAUTION: Carefully avoid touch contamination.)

X. Insert secondary tubing needle into secondary port of primary IV tubing

Y. Tape this connection securely

Z. Regulate flow-control clamp on secondary tubing to proper rate

AA. Wash hands before leaving room

ACCESSORY EQUIPMENT
UNIT VII

JOB SHEET #2--LOWER CONTAINER TO REMOVE AIR FROM SECONDARY TUBING

I. Equipment--IV system with secondary tubing

II. Procedure

A. Wash hands

B. Remove piggyback container from IV pole

C. Lower piggyback container approximately 12 to 18 inches below primary container

D. Fully open flow-control clamp on secondary tubing

(NOTE: Primary solution will now flow up into secondary tubing and drip chamber.)

(CAUTION: If the primary solution contains an additive, the additive's compatibility with the medication given through the secondary tubing must be checked. If the two are not compatible, another technique must be used.)

EXAMPLE: Multivitamin in primary solution and Keflin given through secondary tubing

E. Close flow-control clamp on secondary tubing after tubing is free of air

F. Suspend piggyback container from IV pole

(NOTE: Secondary tubing is now free of air and ready for the next administration of medication.)

G. Wash hands before leaving room

ACCESSORY EQUIPMENT
UNIT VII

JOB SHEET #3--DIRECT AIR INTO DRIP CHAMBER TO REMOVE AIR FROM SECONDARY TUBING

I. Equipment--IV system with secondary tubing

II. Procedure

A. Wash hands

B. Identify yourself to patient and/or family

C. Find level of fluid in tubing

D. Pinch tubing shut with fingers about 12 inches below fluid level

E. Move flow-control clamp down to about 6 inches below fluid level

F. Refill drip chamber

G. Hold gentle tension downward on IV tubing

H. Flick tubing with fingers

(NOTE: Air always moves upward and will enter drip chamber.)

I. With fingers, pinch tubing shut below flow-control clamp after tubing is free of air

J. Move flow-control clamp up under drip chamber and close clamp

(NOTE: This method is very time-consuming if there is a large amount of air in the tubing.)

K. Wash hands before leaving room

ACCESSORY EQUIPMENT
UNIT VII

JOB SHEET #4--USE NEEDLE TO REMOVE AIR FROM SECONDARY TUBING

I. Equipment

  A. Needle, #20 gauge

  B. Alcohol sponge

  C. Two gauze 4x4s

II. Procedure

  A. Obtain equipment and take to patient's room

  B. Wash hands

  C. Identify yourself to patient and/or family

  D. Turn off flow-control clamp

  E. Hang new piggyback solution

  F. Refill drip chamber

  G. Find level of fluid in tubing

  H. Find a secondary port or use flashback (Travenol tubing) below this fluid level

  I. Cleanse this port with alcohol sponge

  J. Lay or hold 4x4s under chosen secondary port or flashback

  K. Insert #20-gauge needle into port or flashback

  (NOTE: The fluid below the air will flow out first, and then the air will gush out, followed by fluid.)

  L. Close flow-control clamp as soon as air has evacuated tube

  M. Remove needle

  N. Discard needle and 4x4s in appropriate place

  O. Wash hands before leaving room

ACCESSORY EQUIPMENT
UNIT VII

JOB SHEET #5--ROLL TUBING AROUND PEN OR PENCIL TO REMOVE AIR FROM SECONDARY TUBING

I. Equipment

- A. IV system with secondary tubing
- B. Appropriate IV solution for secondary system
- C. Pencil or long pen

II. Procedure

- A. Obtain pencil or pen and take to patient's room
- B. Wash hands
- C. Identify yourself to patient and/or family
- D. Find level of fluid in tubing
- E. Move flow-control clamp down to about 6 inches below fluid level
- F. Close clamp
- G. Hang new secondary solution
- H. Refill drip chamber
- I. Move IV pole to its lowest position
- J. Place tubing over pencil or pen approximately 3 or 4 inches below fluid level
- K. Wind tubing around pencil or pen tightly

  (NOTE: This procedures compresses the tubing and forces the air up into the drip chamber.)
- L. Unwind pencil after tubing is free of air

  (NOTE: Tubing will be curled and even kinked, but simple manipulation will unwind it.)
- M. Use fingers to pinch tubing shut below flow-control clamp
- N. Move flow-control clamp back up under drip chamber; close clamp

  (NOTE: Tubing is now ready for the administration of medication.)
- O. Move IV pole back up to its original position
- P. Wash hands before leaving room

ACCESSORY EQUIPMENT
UNIT VII

JOB SHEET #6--SET UP PIGGYBACK ADMINISTRATION SET INTO BACKCHECK VALVE

I. Equipment

A. To be used in medication room or at patient's nurse server

1. Medication
2. Syringe of appropriate size
3. Needles, #18 to #20 gauge
4. "Medication added" label
5. Diluent if required
6. Alcohol sponges
7. Partial-fill container of appropriate solution

B. To be used in patient's room

1. Short secondary IV tubing
2. Alcohol sponges
3. Tape

II. Procedure

(NOTE: Perform steps A-H in the medication room or at the patient's nurse server.)

A. Wash hands

B. Reconstitute medication properly

(NOTE: Many hospitals now have a system in which the pharmacy prepares the medication and sends to the floor a full twenty-four-hour supply for each patient. The medication is ready for use in the partial-fill container.)

C. Draw up medication using #18-gauge needle and appropriate size syringe

D. Remove protective covering from spike port of glass containers

E. Cleanse partial-fill container injection port or spike port with alcohol sponge

JOB SHEET #6

F. Inject medication into container

G. Label container properly

(NOTE: Label immediately after the medication is added.)

H. Gently rotate partial-fill container to mix solution and medication thoroughly

I. Take IV tubing, alcohol, sponges, tape, and partial-fill container containing medication to patient's room

J. Wash hands

K. Identify yourself to patient and/or family

L. Identify patient

M. Explain procedure to patient

N. Open packaging of secondary tubing and remove tubing

O. Move flow-control clamp up under drip chamber

P. Cleanse spike port of glass container with alcohol sponge

Q. Remove protective cap from spike of secondary tubing

(CAUTION: Carefully avoid touch contamination.)

R. Spike container with secondary tubing

S. Attach #20-gauge needle to secondary IV tubing

(NOTE: Some of the short secondary tubings come with a needle permanently fused to the tubing.)

T. Suspend piggyback container from IV pole

U. Suspend primary solution from hanger provided with secondary tubing

V. Fill (prime) secondary tubing

W. Use alcohol sponge to cleanse secondary port just opposite or below back-check valve

X. Insert secondary tubing needle into this port

Y. Tape this connection securely

Z. Open flow-control clamp on secondary tubing

(NOTE: The flow of the primary solution will now stop.)

JOB SHEET #6

AA. Adjust flow-control clamp on primary IV tubing to proper flow rate for medication

(NOTE: When the medication container empties, the primary IV solution will restart. The flow rate of the primary solution will have to be reset at the prescribed rate if the main flow-control clamp was changed.)

BB. Wash hands before leaving room

ACCESSORY EQUIPMENT
UNIT VII

JOB SHEET #7--FLUSH SECONDARY TUBING BETWEEN MEDICATIONS--BACKCHECK VALVE

I. Equipment--IV system with secondary tubing

II. Procedure

- A. Wash hands
- B. Identify yourself to patient and/or family
- C. Pinch main IV tubing above backcheck valve with fingers
- D. Open flow-control clamp on secondary tubing
- E. Allow remaining medication in secondary tubing to infuse
- F. As soon as fluid in secondary tubing reaches needle hub, close secondary tubing flow-control clamp

  (CAUTION: Be very careful not to allow air to enter main IV tubing.)
- G. Remove piggyback container from IV pole
- H. Lower piggyback container approximately 12 inches below primary container
- I. Fully open flow-control clamp on secondary tubing

  (NOTE: Primary solution will now flow back up into secondary tubing.)
- J. Allow fluid to half fill drip chamber of secondary tubing

  (NOTE: Tubing is now ready for the next medication.)
- K. Suspend piggyback container from IV pole
- L. Wash hands before leaving room

ACCESSORY EQUIPMENT
UNIT VII

TEST

NAME ________________________________ SCORE ______________

1. Match terms associated with accessory equipment to their correct definitions. Write the correct numbers in the blanks.

_____a. Precision; state of being accurate

_____b. Twisted, curled, or bent

_____c. Substance that makes something impure

_____d. To change

_____e. Not moving; fixed

_____f. Not suitable for use together

_____g. To introduce a liquid substance into the body

_____h. Electronic device that automatically delivers IV fluids at preselected flow rates with great accuracy

_____i. Substance added to another

_____j. One thousandth of a liter

_____k. At the same time

_____l. To apply pressure

_____m. Membrane or device that permits fluids to flow in one direction only

_____n. Heavy, sticky, fluid consistency; offers resistance to flow

1. Infuse
2. Simultaneously
3. Incompatibility
4. Infusion pump
5. Contaminant
6. Exert
7. Kinked
8. Additive
9. Valve
10. Stationary
11. Accuracy
12. Milliliter (ml)
13. Viscosity
14. Convert

2. Discuss the different types of piggyback systems.

a. Regular straight tubing as a secondary tubing into a secondary port--__________

____

____

____

____

TEST

b. Short secondary tubing into secondary port opposite a backcheck valve--_______

____

____

____

____

3. Match terms associated with volume control devices to their correct definitions. Write the correct numbers in the blanks.

_____a. Small opening permitting passage or escape of gas

_____b. Opening

_____c. Device for straining out impurities

_____d. To clean or empty by flow of solution

_____e. Tiny opening through which fluids may pass

_____f. Increase or addition in number, size, or volume

_____g. Thin, soft, pliable tissue layer that covers or lines a body part

_____h. Joint on which something swings

_____i. Mechanical contrivance

_____j. Making ready; preparing

_____k. To break; burst

_____l. Enclosed space

_____m. Quantity or amount of occupied space

1. Hinge
2. Volume
3. Rupture
4. Membrane
5. Device
6. Port
7. Priming
8. Chamber
9. Vent
10. Pore
11. Increment
12. Flush
13. Filter

4. Select from the following list characteristics of volume control devices. Write an "X" in the blank before each correct answer.

_____a. Contain a flashback on distal tip

_____b. Contain Y-tubing on upper IV tubing

_____c. Chamber marked in 1 milliliter increments

_____d. Contain an air vent

TEST

______e. Ports can be added for additives

______f. Emit distinctive "pop" when drip chamber is filled

______g. Priming and filling procedures vary by manufacturer

______h. Consist of IV tubing, fluid chamber, and IV tubing containing at least one secondary port

______i. Chamber marked in 10 milliliter increments

______j. Contain a port for additives

______k. Volume of fluid held by chamber varies by manufacturer from 100 milliliters to 200 milliliters

______l. Opaque in color

______m. Contain a device in chamber that closes off when chamber is empty

______n. Contain two clamps, one above and one below fluid chamber

5. Describe types of volume control devices.

a. Floating valve filter--____

____

____

b. Membrane filter--____

____

6. List uses for volume control devices.

a. ____

b. ____

7. Match terms associated with infusion pumps to their correct definitions. Write the correct numbers in the blanks.

______a. Closure or blockage

______b. Not letting light pass through

______c. Period of time within which a round of regularly recurring events is completed

______d. Anything hollow or solid with a long, round shape

______e. Pertaining to inert, synthetic, soft plastic

1. Occlusion
2. Cylinder
3. Opaque
4. Cycle
5. Silastic

TEST

_____ f. Pertaining to a line or lines; resembling a line

_____ g. One millionth of a meter; one thousandth of a millimeter

_____ h. To make active or functioning

_____ i. Device used to discover a problem

_____ j. Wavelike contractions and dilation of tubing walls that move contents onward

_____ k. Disc closely fitted in a hollow cylinder; moved by a rod to exert pressure on fluid in cylinder

_____ l. Electronic device that automatically delivers IV fluids at preselected flow rates with great accuracy

_____ m. Of or based on the measurement of volume

_____ n. Turning around a central point

_____ o. Device that receives and transmits impressions

_____ p. In regular order

_____ q. Loud enough to be heard

_____ r. Force exerted against an opposing body; expressed in weight per unit of area

_____ s. Mechanical contrivance

6. Detector
7. Peristalsis
8. Pressure
9. Sensor
10. Activate
11. Linear
12. Device
13. Sequential
14. Micron
15. Volumetric
16. Piston
17. Rotary
18. Audible
19. Infusion pump

8. Discuss the advantages and disadvantages of infusion pumps.

   a. Advantages--____

   ____

   ____

   ____

   ____

   b. Disadvantages--_______________________________________

   ____

   ____

   ____

TEST

9. Distinguish among characteristics of infusion pump delivery systems. Write the correct numbers in the blanks. Numbers may be used more than once.

______a. Set of rollers attached to a rotating disc move fluid through tubing by alternately squeezing and releasing a section of tubing

______b. Flow rate set in milliliters per hour

______c. Delivers infusion by action of a piston and cylinder

______d. Regulates by a magnetically activated metal ball valve and drop detector

______e. Delivers infusion by gravity and an electronic drop counter

______f. Flow rate set in drops per minute

______g. Series of fingerlike projections move fluid through tubing by sequentially advancing and retracting

______h. Delivers infusion by peristaltic movement of tubing and a drop counter

______i. Moves fluid by exerting pressure on fluid to push a set amount of fluid from cylinder

1. Controller
2. Nonvolumetric (rotary and linear)
3. Volumetric

10. Distinguish among advantages and disadvantages of types of infusion pumps. Write a "C" before controller, "NV" before nonvolumetric, and a "V" before volumetric. Blanks may contain more than one correct answer.

a. Advantages

______ 1) Delivers moderately high flow rates

______ 2) Can use regular IV tubing

______ 3) Requires minimal inservice time

______ 4) Delivers low flow rates

______ 5) Less expensive than volumetric

______ 6) Most accurate

TEST

______ 7) Delivers fluid at an even rate

______ 8) Simple to use

______ 9) Delivers high flow rates

b. Disadvantages

______ 1) Cannot be used when venous pressure is high

______ 2) Rupture of small pore in line filter may occur with pressure increase

______ 3) Requires special administration tubing

______ 4) Cannot be used for flow rates over 200 milliliters per hour

______ 5) Viscosity of fluid affects flow rate

______ 6) Fluid will infuse at wide-open rate when door is open

______ 7) Sometimes require special administration devices

______ 8) High delivery pressure increases risk of infiltration

______ 9) Opaque fluids cannot always be delivered

______10) Is expensive

______11) Requires more time to fill (prime) tubing and set up pump

______12) Cannot be used for flow rates below 10 milliliters per hour

______13) Requires more in-service time

______14) Tubing must be changed to deliver flow rates higher than 99 milliliters per hour

______15) Tubing must be moved up or down 4 to 6 inches once every eight hours on some pumps

______16) Swinging of container during transport or ambulation can cause alarm to sound

______17) Delivers fluids at an uneven rate

______18) Any air in cylinder can change volume of fluid delivered by each cycle

11. List special features of infusion pumps.

a. ____

b. ____

c. ____

TEST

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

12. List nursing responsibilities and interventions with regard to infusion pumps.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

j. ____________________

k. ____________________

l. ____________________

m. ____________________

n. ____________________

13. Discuss extension tubing.

____

____

____

____

____

TEST

(NOTE: Test question 14 lists the job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

14. Demonstrate the ability to

    a. Set up piggyback administration set into secondary port.

    b. Lower container to remove air from secondary tubing.

    c. Direct air into drip chambers to remove air from secondary tubing.

    d. Use needle to remove air from secondary tubing.

    e. Roll tubing around a pen or pencil to remove air from secondary tubing.

    f. Set up piggyback administration set into backcheck valve.

    g. Flush secondary tubing between medications--backcheck valve.

ACCESSORY EQUIPMENT
UNIT VII

ANSWERS TO TEST

1. a. 11
   b. 7
   c. 5
   d. 14
   e. 10
   f. 3
   g. 1
   h. 4
   i. 8
   j. 12
   k. 2
   l. 6
   m. 9
   n. 13

2. a. Regular straight tubing as a secondary tubing into a secondary port
      1) Both piggyback solution and main solution can infuse simultaneously
      2) Separate tubings must be used for each medication to avoid any possible incompatibilities
   b. Short secondary tubing into secondary port opposite a backcheck valve
      1) Only one solution will infuse at a time
      2) Same tubing is used for each medication
      3) Main IV solution must be hung lower than piggyback solution
      4) Secondary tubing must be flushed between medications

3. a. 9
   b. 6
   c. 13
   d. 12
   e. 10
   f. 11
   g. 4
   h. 1
   i. 5
   j. 7
   k. 3
   l. 8
   m. 2

4. c, d, g, h, j, k, m, n

ANSWERS TO TEST

5. a. Floating valve filter
    1) Consists of a chamber with a valve on a hinge
    2) Hinge allows valve to move up and down with changes in chamber's fluid level
    3) Closes off drip chamber when fluid chamber is empty

   b. Membrane filter
    1) Valve remains rigid and stationary at bottom of fluid chamber
    2) Closes off drip chamber when fluid chamber is empty

6. a. Precise control over fluid volume in high-risk patients

   b. Infusion of medications

7.

a.	1	k.	16
b.	3	l.	19
c.	4	m.	15
d.	2	n.	17
e.	5	o.	9
f.	11	p.	13
g.	14	q.	18
h.	10	r.	8
i.	6	s.	12
j.	7		

8. Discussion should include the following

   a. Advantages
    1) Have alarms that warn of a problem
    2) Can be used with any type of container
    3) Can be used with in-line filter
    4) Can be used for infusion of other liquids

ANSWERS TO TEST

b. Disadvantages

  1) Are expensive
  2) Require relatively large amount of storage space
  3) Require inservice time
  4) Require extra time to clean following each use

9. a. 2
   b. 3
   c. 3
   d. 1
   e. 1
   f. 1, 2
   g. 2
   h. 2
   i. 3

10. a. 1) NV
       2) NV, C
       3) NV, C
       4) V, NV
       5) C, NV
       6) V
       7) V, C
       8) NV, C
       9) V
    b. 1) C
       2) V
       3) V
       4) C
       5) C, NV
       6) C, NV
       7) C, NV
       8) V, NV
       9) C
       10) V
       11) V
       12) C
       13) V
       14) C, NV
       15) NV
       16) C
       17) NV
       18) V

11. a. Alarms (visible and audible)
    b. Flow rate settings
    c. Meters
    d. Drop sensor
    e. Air detector
    f. Infiltration detector

ANSWERS TO TEST

- g. Battery
- h. Occlusion detector

12. a. Learn and understand the characteristics and features of the pump and how it works
    - b. Explain pump to patient and patient's family
    - c. Enlist patient's cooperation
    - d. Check filter before setting up tubing
    - e. Select proper administration set
    - f. Fill tubing and/or cylinder properly
    - g. Set up pump according to manufacturer's directions
    - h. Monitor flow rate at least once an hour
    - i. Monitor IV site for complications
    - j. Tape all connections
    - k. Check eletrical inspection tag
    - l. Move tubing up or down every eight hours when using peristaltic pump
    - m. Replace IV container before it is empty
    - n. Document your actions on chart

13. Discussion should include the following
    - a. Added to distal tip of IV tubing
    - b. Connects to IV needle or catheter
    - c. Allows greater patient mobility
    - d. Comes in many different types
    - e. Varies according to manufacturer

14. Performance skills evaluated to the satisfaction of the instructor

VENIPUNCTURE PROCESS
UNIT VIII

UNIT OBJECTIVE

After completing this unit, the student should be able to perform the venipuncture process and calculate and establish the prescribed flow rate. The student should also be able to label all areas properly and document his or her actions on the appropriate chart form. This knowledge will be shown by completing assignment sheets, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with venipuncture to their correct definitions.
2. Discuss considerations for selection of insertion site.
3. Arrange in order steps for preparation and performance of venipuncture.
4. Discuss reasons for using splints.
5. State guidelines for choosing a splint.
6. Describe positioning and taping of hand or arm on splint.
7. State nursing interventions with regard to using splints.
8. Discuss rules for using restraints.
9. Arrange in order steps in establishing prescribed flow rate.
10. State steps used to calculate flow rates.
11. Label information required on container and tubing, and at insertion site.
12. Discuss the documentation of venipuncture.
13. Calculate flow rates.
14. Document venipuncture process.
15. Demonstrate the ability to
    a. Apply a tourniquet.
    b. Use techniques for filling veins.
    c. Identify vein in an edematous arm.
    d. Palpate a vein.

OBJECTIVE SHEET

e. Prepare the insertion site.

f. Remove catheter and/or needle from package and inspect.

g. Perform venipuncture using a wing-tipped needle.

h. Tape and dress a wing-tipped needle.

i. Perform venipuncture using an over-the-needle catheter.

j. Tape and dress an over-the-needle catheter.

VENIPUNCTURE PROCESS
UNIT VIII

SUGGESTED ACTIVITIES

I. Suggested activities

A. Order filmstrip teaching kits to supplement unit.

1. *Venipuncture and Starting an Intravenous Infusion,* #178. Color, 30 minutes, Trainex Corporation, 1969. Available from Trainex Corporation, 12601 Industry Street, Garden Grove, California 92641. Toll-free number: 800-854-2485.

2. *Venipuncture: Catheter and Scalp Vein Needles,* #244. Color, 30 minutes, Trainex Corporation, 1973. Available from Trainex Corporation, 12601 Industry Street, Garden Grove, California 92641. Toll-free number: 800-854-2485.

B. Order equipment.

1. One artifical arm for every four to five students

   (CAUTION: When using artificial arms, use only distilled water with the blood concentrate as the blood solution.)

2. At least two IV containers for each student

   (NOTE: Only after use on artificial arms may some types of containers be reused.)

   (CAUTION: When using artificial arms empty the IV containers of IV solution and then rinse and refill with distilled water.)

3. Two IV tubings for each student

4. Two IV needles and catheters of each kind for each student

   a. Wing-tipped needle

   b. Over-the-needle catheter

5. At least four packages gauze 2x2s for each student

   (NOTE: One package of gauze 2x2s is to be used with distilled water as the "prep agent" on the artificial arm.)

6. At least one betadine and alcohol sponge for each student

   (NOTE: Betadine and alcohol sponges are not to be used on the artificial arms.)

SUGGESTED ACTIVITIES

7. One tourniquet for every two students
8. One roll of 1/2-inch and 1-inch tape per student
9. One IV pole for each artificial arm
10. Examples of long and short splints
11. Example of a wrist restraint
12. Examples of manufacturer-made container and "medication added" labels
13. Distilled water
14. Two small, shallow, open containers for each artificial arm

    EXAMPLE: Emesis basins

    (NOTE: Container will be used as a receptacle to catch IV solution from the outlet tubing of the arms and as the container for the distilled water to be used as the "prep agent" for the arms.)
15. At least two towels or other absorbent material for each arm

    (NOTE: Toweling is to be used under artificial arms to absorb spills and to protect table.)
16. One flat surface for each arm

    (NOTE: The surface should be of sufficient height for student comfort when performing venipuncture.)

C. Make transparencies.

D. Pretest students to assess their present knowledge of the subject.

E. Provide students with objective sheet.

F. Provide students with information, assignment, and job sheets.

G. Discuss unit and specific objectives.

H. Discuss information sheet.

I. Individualize instruction for students with special needs.

J. Discuss assignment sheets.

K. Set up arms.

(NOTE: Follow directions provided with arms.)

SUGGESTED ACTIVITIES

L. Lay out equipment for ease of use.

M. Demonstrate and discuss procedures outlined in job sheets.

N. Give test.

O. Discuss test.

P. Reteach if necessary.

II. Instructional materials

A. Objective sheet

B. Suggested activities

C. Information sheet

D. Transparency masters

1. TM #1--Calculating Flow Rates
2. TM #2--Making Double-Faced Tape
3. TM #3--Veins of the Hand
4. TM #4--Veins of the Forearm and Elbow

E. Assignment sheets

1. Assignment Sheet #1--Calculate Flow Rates
2. Assignment Sheet #2--Document Venipuncture Process

F. Answers to assignment sheets

G. Job sheets

1. Job Sheet #1--Apply a Tourniquet
2. Job Sheet #2--Use Techniques for Filling Veins
3. Job Sheet #3--Identify Vein in an Edematous Arm
4. Job Sheet #4--Palpate a Vein
5. Job Sheet #5--Prepare the Insertion Site
6. Job Sheet #6--Remove Catheter and/or Needle from Package and Inspect

    7. Job Sheet #7--Perform Venipuncture Using a Wing-Tipped Needle
    8. Job Sheet #8--Tape and Dress a Wing-Tipped Needle
    9. Job Sheet #9--Perform Venipuncture Using an Over-the-Needle Catheter
    10. Job Sheet #10--Tape and Dress an Over-the-Needle Catheter

- H. Test
- I. Answers to test

III. Unit references

- A. Cohen, Michael R. "Medication Errors: Label IV Bags as Soon as You Add Medications to Them." *Nursing79,* Vol. 9, No. 11 (November, 1979), p. 22.
- B. Feeney, Lynn A. "Documentation of IV Therapy." *American Journal of Intravenous Therapy and Clinical Nutrition,* Vol. 6 (1979), pp. 37-41.
- C. Masoorlic, Susan Thomas. "Trouble Free IV Starts." *RN,* Vol. 44, No. 2 (February, 1981), pp. 20-27.
- D. Memmler, Ruth Lundeen, and Dena Lin Wood. *The Human Body in Health & Disease,* 4th ed. Philadelphia: J.B. Lippincott Co., 1977.
- E. Menzi, Catherine C., and Susan Thomas Masoorlic. "Troubles with IVs: Try These Tips and Techniques." *Nursing78,* Vol. 8, No. 10 (October, 1978), pp. 78-84.
- F. Plumer, Ada L. *Principles and Practices of IV Therapy,* 2nd ed. Boston: Little, Brown & Co., 1970.
- G. Rozovsky, Lorene Elkins. "Answers to the 15 Legal Questions Nurses Ask." *Nursing78,* Vol. 8, No. 7 (July, 1978), pp. 73-77.
- H. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management.* Philadelphia: J.B. Lippincott, 1980.
- I. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary,* 14th ed. Philadelphia: F.A. Davis Co., 1981.
- J. West, Richard Samuel, ed. *Managing IV Therapy,* Nursing Photobook Series. Horsham, Pennsylvania: Intermed Communications, Inc., 1980.

IV. Recommended additional reading

- A. Misik, Irene. "About Using Restraints with Restraint." *Nursing81,* Vol. 11, No. 8 (August, 1981), pp. 50-55.
- B. Payne, Johnie E., and Harold M. Kaplan. "Alternative Techniques for Venipuncture." *American Journal of Nursing,* Vol. 72, No. 4 (April, 1972), pp. 702-703.

VENIPUNCTURE PROCESS
UNIT VIII

INFORMATION SHEET

I. Terms and definitions

A. Agent--Substance that causes change

B. Antimicrobial--Working against organisms such as bacteria

C. Bevel--Angled surface

D. Bifurcation--Place where vein has two branches; fork

E. Combative--Eager to fight

F. Contaminant--Substance that makes something impure

G. Contour--Outline or surface configuration of a part

H. Dependent edema--Collection of fluids in a body part; caused by body part being lower than the rest of the body

I. Dominant--Prevailing; most used

J. Flush--To clean or empty by a flow of solution

K. Hamper--Hinder; to keep from moving or acting freely

L. Impede--To bar or hinder the progress of

M. Increment--An increase or addition in number, size, or volume

N. Lumen--Inside opening of a tube

O. Over-the-needle catheter (ONC)--Soft, flexible intravenous catheter, closely fitted over a stylet

(NOTE: The stylet is removed after insertion of catheter into vein.)

P. Palpate--To examine by touching

Q. Predispose--To make susceptible; to make receptive beforehand

EXAMPLE: Fatigue predisposes one to illness.

R. Stylet--Sharp, pointed device

S. Taut--Stretched tightly

T. Tolerance--Amount of variation allowed from a standard

U. Tortuous--Full of twists and turns; winding; crooked

INFORMATION SHEET

II. Considerations for selection of insertion site

A. Length of therapy

1. For short-term therapy, use hand or arm of nondominant side

2. For long-term therapy, start low on extremity

(NOTE: Each succeeding venipuncture should be on alternating arm and be moved upward on the arm.)

B. Type of needle or catheter chosen (Transparencies #3 and #4)

1. Wing-tipped needle requires a relatively flat and stable site

(NOTE: Do not use a wing-tipped needle in areas of flexion, such as a joint.)

2. Over-the-needle catheter (ONC) may be used at any site including an area of flexion

(NOTE: This device can be used in an area of flexion because of its soft, flexible character.)

(CAUTION: A joint area should be used only as a last site and must be splinted or restrained.)

C. Type of solution prescribed

1. Highly irritating solutions require a large blood flow to dilute solution rapidly

EXAMPLES: Peripheral hyperalimentation; additives such as large amounts of potassium chloride (KCl)

2. Viscous solutions require a large vein to accommodate the larger needle or catheter required

EXAMPLES: Blood, blood products

D. Size of needle or catheter

(NOTE: Needle or catheter should not completely fill the vein lumen.)

(CAUTION: If needle or catheter completely fills the vein lumen, it could damage the vein walls and predispose the vein to clot formation.)

1. Viscous solutions usually require 16- to 20-gauge needle or catheter

EXAMPLE: Infusions of blood will require an 18-gauge needle.

INFORMATION SHEET

2. Simple solutions can be infused with a small needle

   EXAMPLE: Infusions of D_5W can be given through a needle as small as 25 gauge.

E. Condition of insertion site--Avoid areas of infection, irritation, or injury

EXAMPLES: Arm of radical mastectomy, arm involved in trauma

(NOTE: Insertion into an infected, irritated, or injured site may increase area of irritation or introduce contaminant from infected area into blood.)

F. Infusion rate prescribed

1. Large volumes of fluid over short periods of time require a large needle or catheter in a large vein

   EXAMPLE: Blood replacement for hemorrhage

2. Small volumes of fluid over long periods of time can be given through small needles or catheters in small veins

III. Steps for preparation and performance of venipuncture (Job Sheets #1-#10)

A. Identify patient's need for IV therapy

(NOTE: Use appropriate communication tool.)

B. Identify patient

C. Collect data for nursing history

D. Explain procedure to patient

(CAUTION: Because of the possibility of swelling occuring in the arm and hand on the insertion side, move rings, watches, and identification band to the other arm.)

E. Select prescribed IV solution

F. Obtain appropriate equipment and take to room

1. Take to room only equipment needed

   EXAMPLES: Needles/catheters, antimicrobial ointment, gauzes, tape, labels

   (NOTE: All the smaller pieces of equipment can be kept on a tray in the medication or equipment room for easy access. For infection control precautions, tray should not be taken into patient's room.)

INFORMATION SHEET

2. Take all needed equipment into room at same time

   (NOTE: It would reduce the patient's confidence in the nurse if the nurse had to leave the room at intervals to obtain pieces of equipment.)

G. Wash hands

H. Prepare equipment

I. Apply tourniquet (Job Sheet #1)

J. Fill and choose vein (Job Sheets #2 and #3)

K. Palpate vein (Job Sheet #4)

L. Prepare insertion site (Job Sheet #5)

M. Prepare tape, ointment, and dressing (Job Sheets # 6 and #8)

N. Perform venipuncture (Job Sheets #7 and #9)

O. Dress and tape needle/catheter and tubing properly (Job Sheets #8 and #10)

IV. Reasons for using splints

(NOTE: In a pinch, a splint can be made from a magazine, IV tubing box, or anything that can immobilize the joint. Always cover the splint with some type of soft material such as a washcloth, and pad any splint not already padded.)

A. To hinder movement of joint

B. To prevent telescoping of catheter or needle

(NOTE: Telescoping is the movement of the catheter slightly in and out of the skin and vein when a joint is flexed.)

EXAMPLE: Catheter at wrist

(CAUTION: Movement of the catheter in the vein predisposes vein to early phlebitis; movement of the wing-tipped needle will cause infiltration.)

C. To prevent bending of catheter

EXAMPLE: Catheter in brachial area (elbow)

D. To provide a flat, stable area for a wing-tipped needle

V. Guidelines for choosing a splint

A. Insertion site in hand or wrist requires a short splint

INFORMATION SHEET

B. Insertion site at brachial area of elbow requires a long splint

(NOTE: A loosely tied wrist restraint may be preferred to a splint. Such a restraint allows slight arm movement and greater patient comfort.)

VI. Positioning and taping of hand or arm on splint

(NOTE: An alternative to taping a splint is the use of a stretch-type gauze. The arm and board can be wrapped with the gauze to hold the splint in place.)

EXAMPLES: Kerlex, Kling

(CAUTION: Leave an area around the insertion site open to check for phlebitis and infiltration.)

A. Wrist with insertion site in hand or top of wrist (Figure 1; Transparency #2)

1. Place palm down and curl fingers over end of board

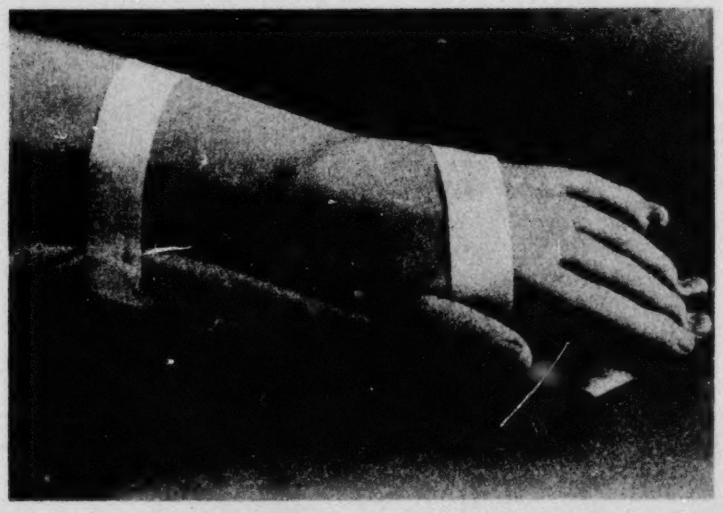
   (NOTE: For patient's comfort, place a folded washcloth under the bend of the wrist.)

2. Place tape, sticky side down, under tubing and over knuckles, leaving thumb free

3. Place double-faced tape over arm approximately 2 inches from end of splint

   EXAMPLE:

FIGURE 1



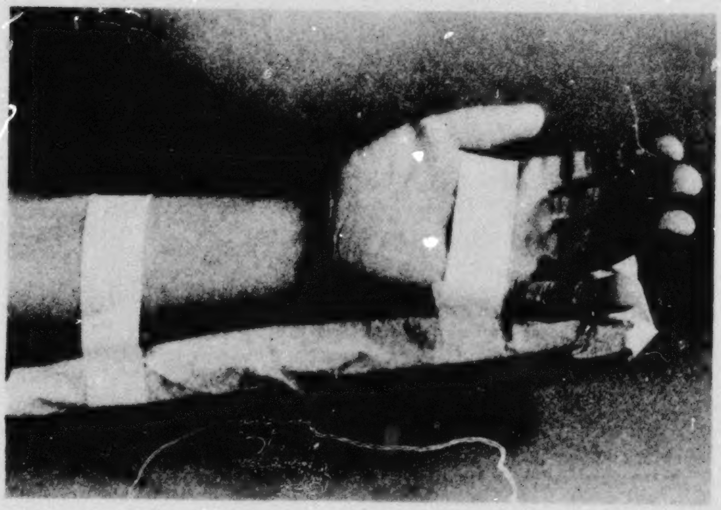
INFORMATION SHEET

B. Wrist with insertion site on underside of wrist (Figure 2)

1. Place palm up on board
2. Place tape, sticky side down, over palm of hand
3. Place double-faced tape over arm approximately 2 inches from end of splint

   EXAMPLE:

FIGURE 2



INFORMATION SHEET

C. Elbow (Figure 3)

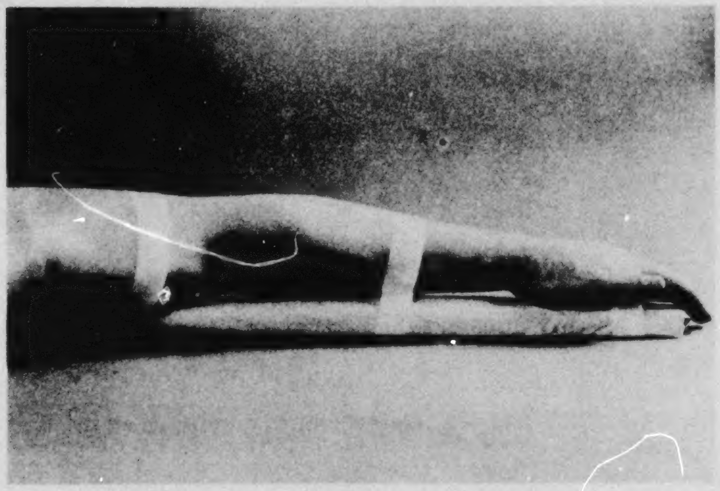
1. Place palm down with fingers curled over end of board
2. Place tape, sticky side down, over top of hand
3. Place double-faced tape at mid-level of forearm
4. Place double-faced tape at least 3 to 4 inches above elbow and at least 2 inches from end of board

   (NOTE: Place tape around arm and onto the board.)

   (CAUTION: Apply tape only tight enough to hold board in place. Do not hamper circulation.)

   EXAMPLE:

FIGURE 3



VII. Nursing interventions with regard to using splints

A. Remove splint at least once per shift

B. Provide slight exercise of joint or joints if possible

C. Keep extremity elevated

(NOTE: Elevation prevents the formation of dependent edema.)

D. Check tape at intervals

(NOTE: Reapply if too tight.)

INFORMATION SHEET

VIII. Rules for using restraints

(NOTE: A restraint confines the patient's arm to one place and restricts movement.)

A. May be required if the patient is restless, confused, combative, or uncooperative

(NOTE: Many institutions require a doctor's order before restraints can be used. Check the institution's policy on the use of restraints.)

B. Must be carefully applied to prevent restriction of IV flow or patient's circulation

(NOTE: In some instances, the restraint can be applied to the splint instead of the patient's arm.)

C. Should be tied to bed frame, not rail

(NOTE: If tied to the rail, it must be untied each time the rail is lowered. Also, if not untied when an attempt is made to lower rail, injury to the patient's extremity could occur.)

D. Should be tied downward toward foot of bed

(NOTE: This position prevents patient from reaching upward.)

E. Should allow arm to be kept slightly elevated

IX. Steps in establishing prescribed flow rate

A. Open flow-control clamp to a rapid flow for 2 to 3 seconds to flush needle/catheter of blood

B. Calculate flow rate and regulate drops per minute when using gravity and clamp system

(NOTE: Flow rate is set in drops of fluid per minute [gtt/min].)

C. Set rate as prescribed by doctor's order

EXAMPLE: 100 cc/hr

X. Steps used to calculate flow rates (Transparency #1; Assignment Sheet #1)

A. Determine amount of solution ordered by doctor

EXAMPLE: 1,000 ml

B. Determine solution delivery time

EXAMPLE: 8 hr

INFORMATION SHEET

C. Divide amount of solution by delivery time to find hourly delivery rate

EXAMPLE: $\frac{1000}{8} = 125$ ml/hr

D. Determine drip factor (drops per milliliter) of IV tubing

(NOTE: Different manufacturers' drip systems deliver different drip rates per milliliter. This drip factor will be found on the tubing package.)

EXAMPLES: Travenol--10 drops (gtt) per ml; Abbott, Cutter, McGaw--15 gtt per ml; IVAC--20 gtt per ml; microdrip systems, 60 gtt per ml

E. Find number of drops per minute by dividing drip system drops per milliliter by 60 seconds per minute, and multiplying by amount of fluid per hour over 1

$$\frac{\text{Drops per Milliliter}}{\text{60 Seconds per Minute}} \times \frac{\text{Amount of Fluid per Hour}}{1} = \text{Number of Drops per Minute}$$

EXAMPLE: Drip system is a Travenol; order is for 1000 ml $\bar{q}$ 8 hr.

$$\frac{1000 \text{ ml}}{8 \text{ hr}} = 125 \text{ ml/hr}$$

$$\frac{10}{60} \times \frac{125}{1} = \frac{1250}{60}$$

$$= \frac{125}{6}$$

= 21 gtt/min to deliver 125 ml/hr

F. When using microdrip system, simply set drop rate at number of milliliters per hour

EXAMPLE: Order is for 1000 ml $\bar{q}$ 8 hr.

$$\frac{1000 \text{ ml}}{8 \text{ hr}} = 125 \text{ ml/hr}$$

$$\frac{60}{60} \times \frac{125}{1} = \frac{7500}{60}$$

$$= \frac{125}{1}$$

= 125 gtt/min to deliver 125 ml/hr

INFORMATION SHEET

XI. Information required on container and tubing, and at insertion site

A. IV container (Figures 4-7)

(NOTE: Place label on container so that it will not cover the solution label printed by the manufacturer.)

FIGURE 4 Container Label

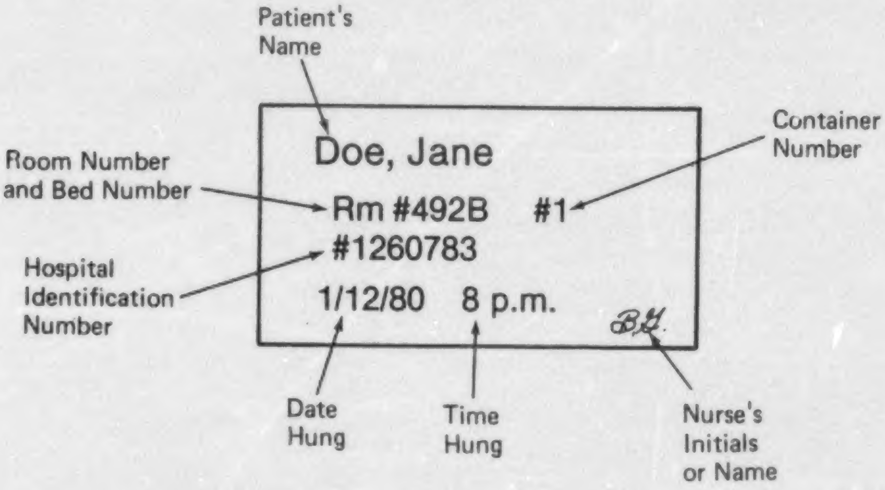
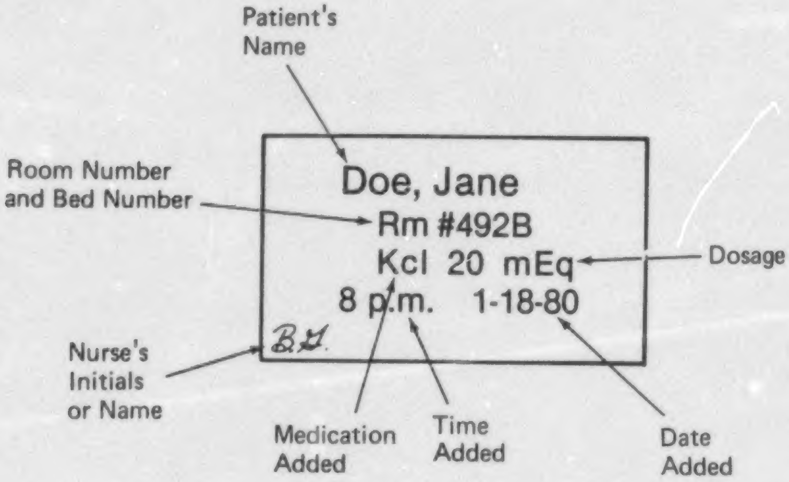


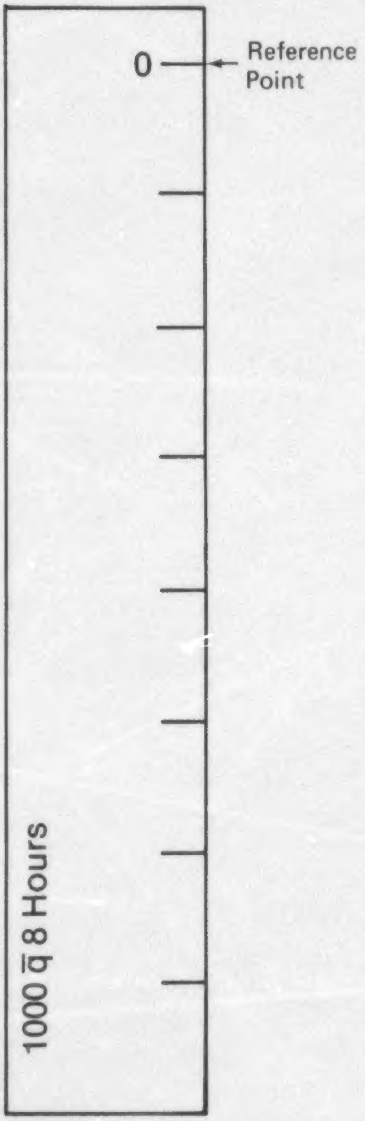
FIGURE 5 Medication-Added Label

(NOTE: Write all information shown on the label below *before* adding medication. Place label on container immediately after adding medication.)



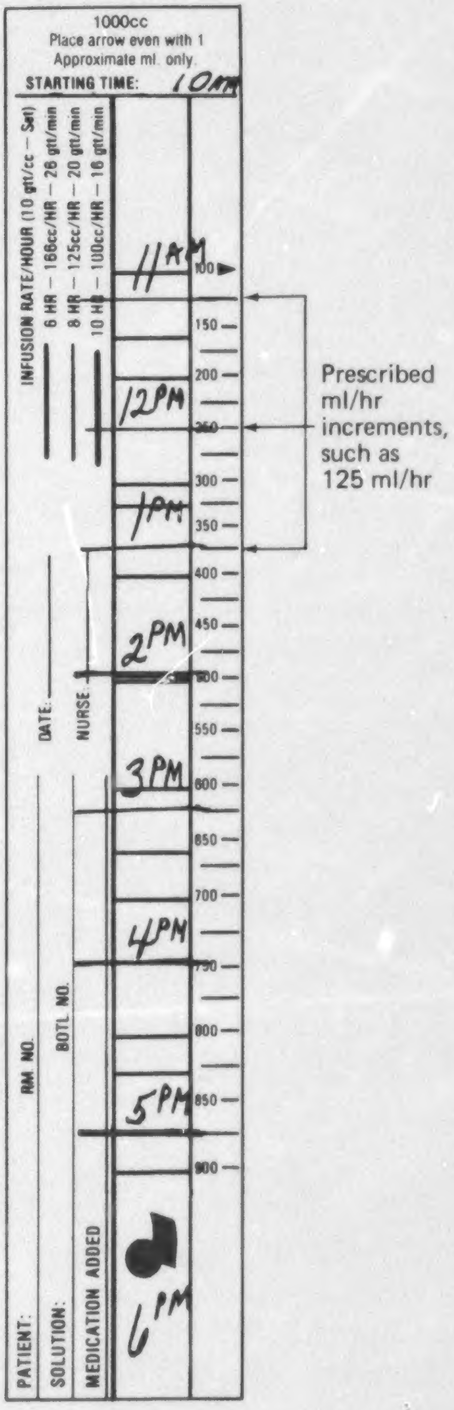
INFORMATION SHEET

FIGURE 6 Master Timing Strip



(NOTE: This master strip is to be placed in a readily accessible area such as the medication room. All timing strips can then be made on tape from this master strip. Mark and label master strip at 0 so that all further strips can be properly placed on container. The master strip must have a reference point so that it can be placed on the container properly.)

FIGURE 7 Manufactured Timing Strip

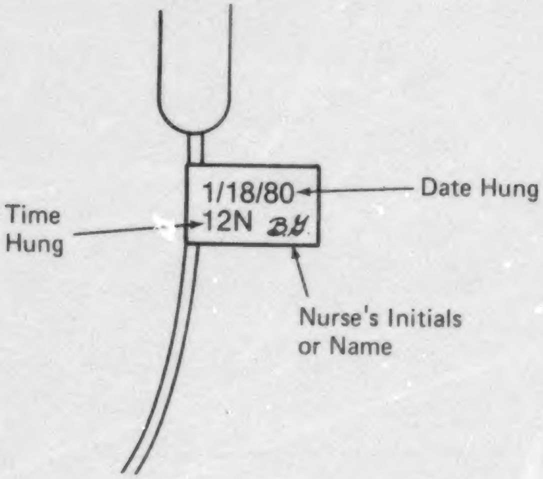


INFORMATION SHEET

B. IV tubing (Figure 8)

(NOTE: Relabel each time tubing is changed.)

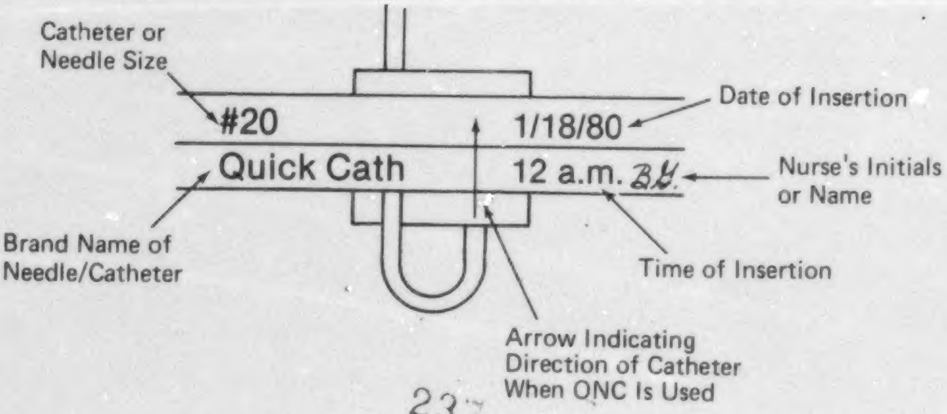
FIGURE 8 IV Tubing Label



C. Insertion site (Figure 9)

(NOTE: Relabel each time the dressing is changed; be sure to indicate original insertion time and date.)

FIGURE 9 IV Site Label



INFORMATION SHEET

XII. Documentation of venipuncture (Assignment Sheet #2)

A. Nurses notes

1. Patient's understanding of procedure
2. Brand name and size of needle or catheter
3. Insertion site
4. Patient's tolerance of procedure
5. Use of splints or restraints
6. Instructions given to patient

EXAMPLES:
Call if IV stops running
Call if insertion site burns
Call if you notice swelling
Do not move clamp

7. Flow rate

EXAMPLE: 125 ml/hr

B. Medication sheet or IV sheet

1. Solution hung
2. Date and time hung
3. Additives
4. Volume hung

Calculating Flow Rates

1. How much solution did the doctor order?
2. Over how much time is this amount to infuse?
3. Divide amount of solution to be given by the delivery time.

   Example:

   $$\frac{1000\text{ ml}}{8\text{ hr}} = 125\text{ ml/hr}$$

4. Decide which type drip system you are using.

   (NOTE: The drop rate per milliliter of fluid varies with each manufacturer of macrodrip tubing. Abbott tubing delivers 15 gtt/ml; Travenol tubing delivers 10 gtt/ml; all microdrip tubings deliver 60 gtt/ml.)

5. Calculate drops per minute to deliver set amount of fluid per hour.

   $$\frac{\text{gtt/ml}}{60\text{ sec/min}} \times \frac{\text{Amt fluid/hr}}{1} = \text{gtt/min}$$

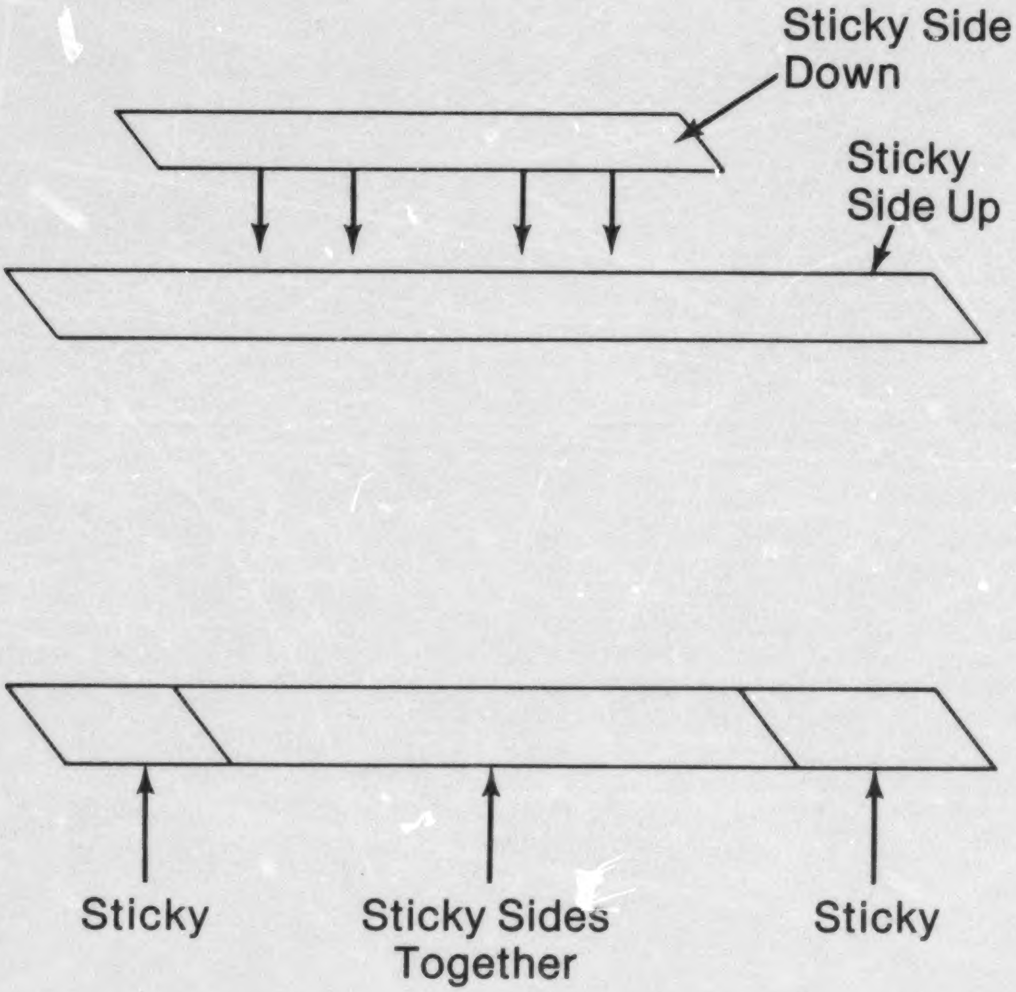
   Example:

   $$\frac{10}{60} \times \frac{125}{1} = \frac{1250}{60} = 21\text{ gtt/min}$$

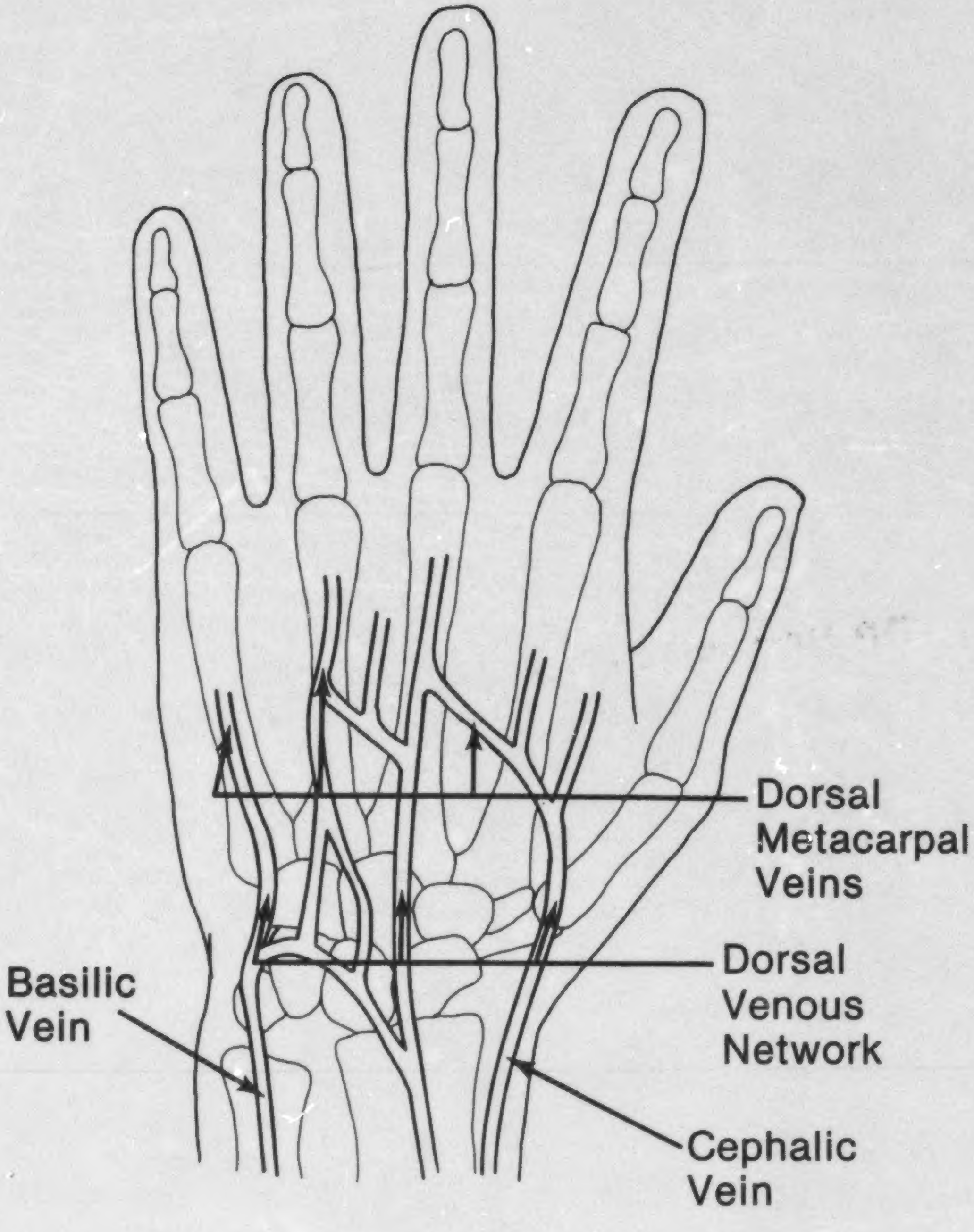
   (NOTE: If you count out and maintain 21 drops per minute, using a 10 drop per milliliter tubing, you will give 125 milliliters per hour.)

TM #1

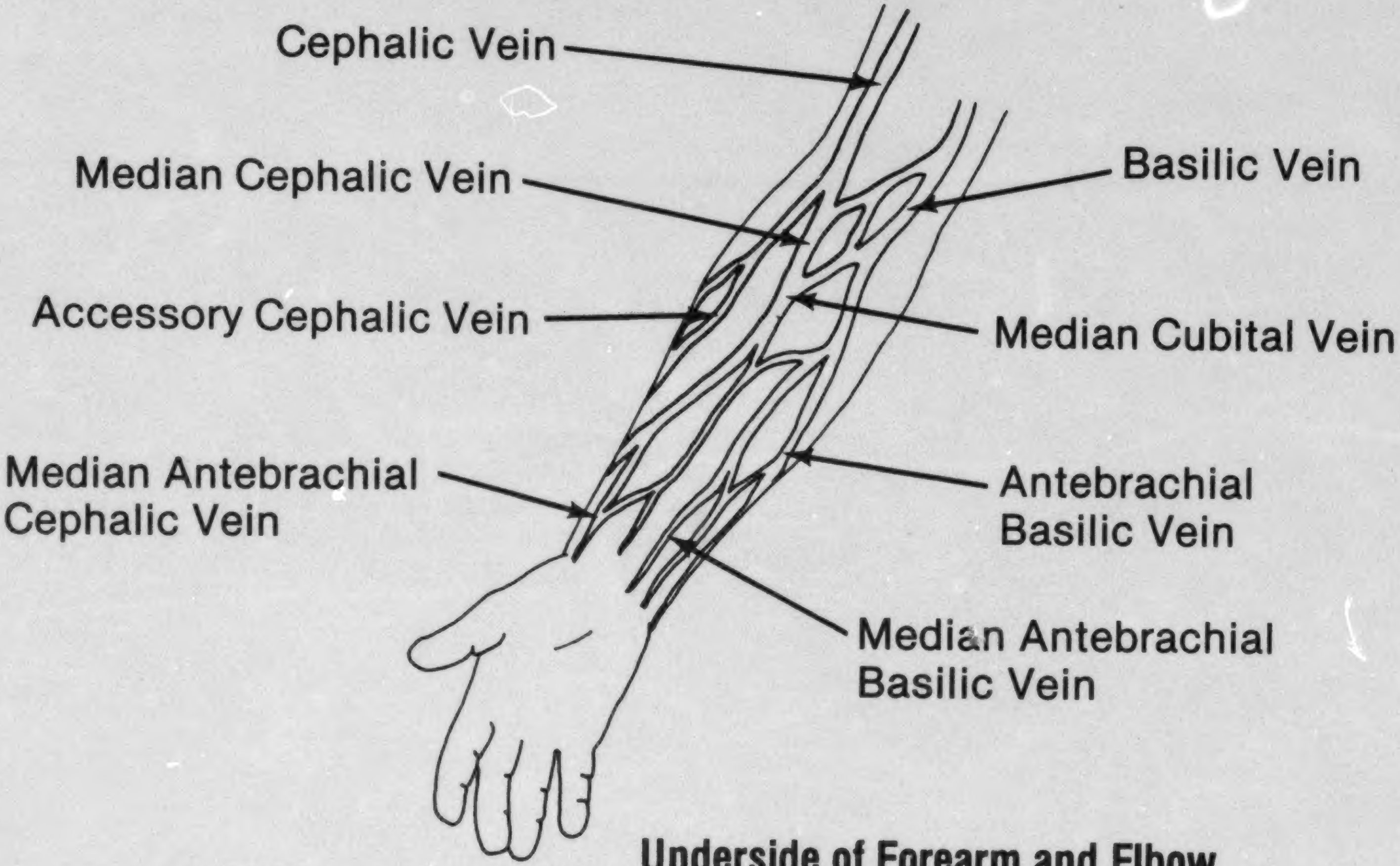
Making Double-Faced Tape



Veins of the Hand



Veins of the Forearm and Elbow


Cephalic Vein
Median Cephalic Vein
Accessory Cephalic Vein
Median Antebrachial Cephalic Vein
Basilic Vein
Median Cubital Vein
Antebrachial Basilic Vein
Median Antebrachial Basilic Vein

Underside of Forearm and Elbow

VENIPUNCTURE PROCESS
UNIT VIII

ASSIGNMENT SHEET #1--CALCULATE FLOW RATES

NAME____________________________________ SCORE____________________

This assignment sheet will give you practice in the calculation of flow rates, so that in the actual clinical setting, you will be able to quickly set the flow rate.

Calculate the flow rate for the following fluid orders and drip systems.

A. 1,000 ml $\bar{q}$ 12 hr; Travenol macrodrip tubing; drip factor 10 gtt/ml

B. 75 ml/hr; IVAC macrodrip tubing; drip factor 20 gtt/ml

C. 150 ml/hr; Abbott macrodrip tubing; drip factor 15 gtt/ml

D. 2,500 ml $\bar{q}$ 24 hr; Cutter macrodrip tubing; drip factor 15 gtt/ml

E. 400 ml $\bar{q}$ 8 hr; McGaw macrodrip tubing; drip factor 15 gtt/ml

F. 40 ml/hr; Travenol microdrip tubing; drip factor 60 gtt/ml

VENIPUNCTURE PROCESS
UNIT VIII

ASSIGNMENT SHEET #2--DOCUMENT VENIPUNCTURE PROCESS

NAME______________________________ SCORE______________

This assignment sheet will give you practice in the charting of the venipuncture process before you have to do it on the patient's chart. It will give you more confidence in the actual clinical setting.

PART I

Write nurses notes for the following venipuncture process.

Venipuncture performed on Mrs. Doe, age 62, admitted by Dr. Right at 12N, 10-14-81, for treatment of acute pancreatitis. IV order is 1,000 ml $D_5$1/2NS $\overline{q}$ 6 hr. Add 20 mEq KCl to each liter.

XYZ MEDICAL CENTER		
DATE	TIME	NURSES NOTES

ASSIGNMENT SHEET #2

PART II

Document the venipuncture process on the following medication sheet.

(NOTE: XYZ Medical Center uses a single medication sheet for both IVs and medications.)

XYZ MEDICAL CENTER MEDICATION SHEET				
DATE	MEDICATION OR IV SOLUTION	7-3	3-11	11-7
		Nurse's Init.____ Name ________	Nurse's Init.____ Name ________	Nurse's Init.____ Name ________

VENIPUNCTURE PROCESS
UNIT VIII

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

A. 83 ml/hr
14 gtt/min

B. 25 gtt/min

C. 38.5 gtt/min

D. 104 ml/hr
26 gtt/min

E. 50 ml/hr
12.5 gtt/min

F. 40 gtt/min

Assignment Sheet #2

PART I--Evaluated to the satisfaction of the instructor

PART II

XYZ MEDICAL CENTER MEDICATION SHEET				
DATE	MEDICATION OR IV SOLUTION	7-3	3-11	11-7
10/14/81	1,000 ml $D_5$1/2NS $\bar{c}$ 20 mEq KCl	2		

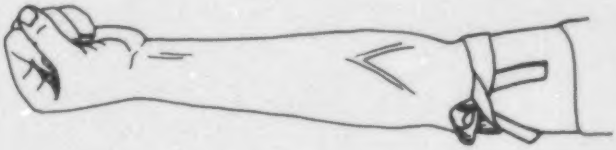
VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #1--APPLY A TOURNIQUET

I. Equipment--Soft rubber tubing about 12 inches long (Figure 10)

(NOTE: Penrose drain tubing is ideal.)

FIGURE 10



Proper Way to Tie a Tourniquet

II. Procedure

A. Identify patient's need for IV therapy by using appropriate communication tool

B. Obtain equipment and take to room

C. Identify yourself to patient and/or family

D. Identify patient

E. Explain procedure to patient

F. Wash hands

G. Choose an approximate insertion site and place tourniquet approximately 3 to 6 inches above this site

(NOTE: If the tourniquet is placed too far from the site, it will be more difficult to fill the vein.)

H. Place tourniquet under arm and pull taut

I. Cross lengths over each other, left under right

J. Grasp crossover with first finger and thumb of nondominant hand

(NOTE: Pull tourniquet tight enough to impede venous return, but not arterial flow. You should be able to feel a radial pulse.)

JOB SHEET #1

K. Tuck a short length of top (left) part of crossover underneath the bottom (right) part of crossover

(NOTE: This short length can then be easily loosened with one hand. A portion of the patient's gown or a piece of gauze can be tucked under the tourniquet for patient comfort.)

(CAUTION: Never tie the tourniquet in a knot. Such a procedure makes removal almost impossible.)

L. Procede with venipuncture

M. Wash hands before leaving room

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #2--USE TECHNIQUES FOR FILLING VEINS

I. Equipment and materials

   A. Tourniquet

   B. Adequate lighting

   C. Warm moist packs if required

II. Procedure

   A. Identify patient's need for IV therapy by using appropriate communication tool

   B. Obtain equipment and take to room

   C. Identify yourself to patient and/or family

   D. Identify patient

   E. Explain procedure to patient

   F. Apply tourniquet as outlined in Job Sheet #1

   G. Provide adequate lighting

   H. Have patient clench and unclench fist

   I. Have patient dangle arm downward over side of bed

   J. Lightly tap the vein above and below chosen site

   (NOTE: If the tap is too hard, it may cause vein spasm.)

   K. Adjust temperature of extremity if necessary

   (NOTE: The temperature of the extremity can greatly affect the filling of the veins. If the extremity is cool or cold to touch, apply a warm moist pack for ten to fifteen minutes. A rubber glove can be applied to a hand for fifteen to thirty minutes to raise the temperature.)

   L. Procede with venipuncture

   M. Wash hands before leaving room

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #3--IDENTIFY VEIN IN AN EDEMATOUS ARM

I. Equipment and materials

- A. Tourniquet
- B. Long, flat armboard
- C. Tape
- D. Elastic bandage, 2-inch or 4-inch width

(CAUTION: Use of an edematous extremity as IV insertion site should be avoided if possible.)

II. Procedure

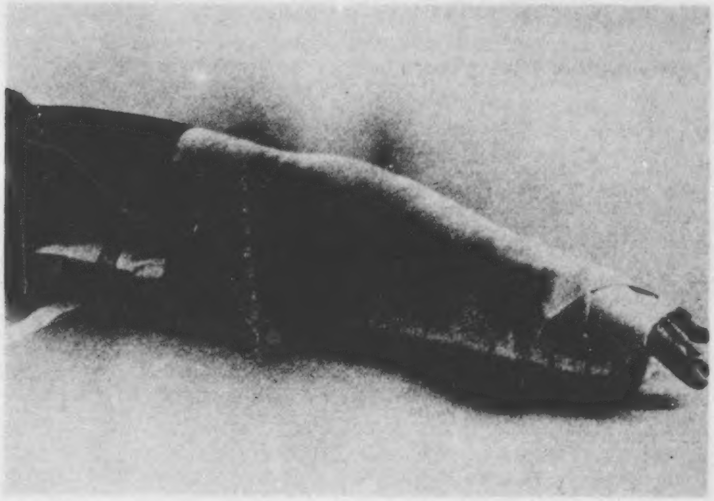
- A. Identify patient's need for IV therapy by using appropriate communication tool
- B. Obtain equipment and take to room
- C. Identify yourself to patient and/or family
- D. Identify patient
- E. Explain procedure to patient
- F. Wash hands
- G. Tape patient's outstretched arm and hand to board
- H. Start at fingers and tightly wrap elastic bandage around hand and board

JOB SHEET #3

I. Wrap arm and board to a point slightly above elbow (Figure 11)

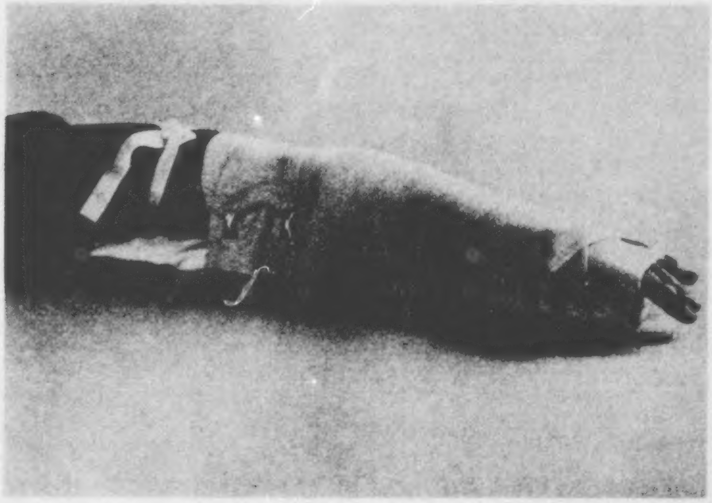
(NOTE: Wrapping squeezes the excess fluid from the soft tissue.)

FIGURE 11



J. Apply tourniquet to upper arm (Figure 12)

FIGURE 12



JOB SHEET #3

K. Remove bandage, leaving tourniquet in place

(NOTE: Veins are now visible.)

L. Perform venipuncture immediately

M. Remove tourniquet after inserting IV needle

N. Wash hands before leaving room

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #4--PALPATE A VEIN

I. Equipment--Tourniquet

II. Procedure

A. Identify patient's need for IV therapy by using appropriate communication tool

B. Obtain equipment and take to room

C. Identify yourself to patient and/or family

D. Identify patient

E. Explain procedure to patient

F. Wash hands

G. Apply tourniquet as outlined in Job Sheet #1

H. Follow criteria for selecting vein

I. Follow procedure for filling a vein as outlined in Job Sheet #2

J. Use one finger, preferably on the hand opposite the one you will use to perform the venipuncture, to palpate the chosen vein for a length of approximately 1/2 inch longer than length of needle or catheter to be used

(NOTE: Always use the same finger and palpate the vein, even if you can see it, to develop your sense of touch.)

K. Check vein for Ys or bifurcations; bulges, indicating valves or obstructions; pulsations, indicating an artery; softness; straightness; scars; or inflammation

(NOTE: If the vein is hard or tortuous, it should not be used. If you feel a bulge, indicating a valve, choose another insertion site. The needle or catheter will not thread through a valve.)

(CAUTION: If an artery is entered, blood will spurt forth. Withdraw needle or catheter, and apply pressure five to ten minutes or until the bleeding has stopped.)

L. Wash hands before leaving room

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #5--PREPARE THE INSERTION SITE

I. Equipment and materials

  A. Tourniquet

  B. Prep sponges

    1. Betadine or provodine iodine

    2. Alcohol

  C. Razor (optional)

II. Procedure

  A. Identify patient's need for IV therapy by using appropriate communication tool

  B. Obtain equipment and take to room

  C. Identify yourself to patient and/or family

  D. Identify patient

  E. Explain procedure to patient

  F. Wash hands

  G. Choose an approximate site

  H. Shave insertion site if necessary

  (NOTE: Shaving is performed for patient's comfort. If the arm is very hairy, removal of tape can cause discomfort.)

  (CAUTION: Extreme care must be used when shaving an arm to avoid scratching the skin. Any scratches made can support infection. Some authorities advocate leaving the actual insertion site unshaved and shaving just the taping area.)

  I. Apply tourniquet as outlined in Job Sheet #1

  J. Choose appropriate vein

  K. Fill vein as outlined in Job Sheet #2

  L. Palpate vein as outlined in Job Sheet #4

JOB SHEET #5

M. Using light friction, apply prep agent

(NOTE: Use circular motion, and move from clean to dirty area, covering about 3 inches.)

(CAUTION: Check for any allergy or sensitivity to iodine. If patient is allergic to iodine, use only alcohol.)

N. Allow prep agent to air dry

(CAUTION: Never blow or wave the prep agent dry. Always allow it to air dry.)

(NOTE: While the prep agent is drying, prepare tape, dressing, and antimicrobial ointment. Place in a convenient location.)

O. Use light friction to remove prep agent with alcohol sponges

(NOTE: Use a circular motion, and move from clean to dirty area. Scrub for approximately 1 minute.)

P. Allow alcohol to air dry

Q. Wash hands before leaving room

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #6--REMOVE CATHETER AND/OR NEEDLE FROM PACKAGE AND INSPECT

I. Equipment--Proper IV needle or catheter in sterile package

II. Procedure

A. Obtain appropriate size and type IV needle or catheter

B. Hold package with label up

C. Tear top of package back to expose needle

D. Remove needle or catheter from package, being careful not to loosen needle protector cap

E. Remove needle protector cap carefully, being careful to avoid possible touch contamination

F. Check visually for barbs or roughness on the needle tip and bevel

G. Check visually for any bumps or frayed edges on catheter tip

H. Check for errors in labeling and/or packaging

(NOTE: This inspection should be done immediately before performing venipuncture.)

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #7--PERFORM VENIPUNCTURE USING A WING-TIPPED NEEDLE

I. Equipment and materials

- A. Appropriate IV solution
- B. Appropriate IV tubing
- C. Appropriate size wing-tipped needle
- D. Tourniquet
- E. Prep sponges
    - 1. Betadine or provodine iodine
    - 2. Alcohol
- F. Gauze 2x2
- G. Antimicrobial ointment
- H. Tape

II. Procedure

- A. Identify patient's need for IV therapy by using appropriate communication tool
- B. Obtain equipment and take to room
- C. Identify yourself to patient and/or family
- D. Identify patient
- E. Explain procedure to patient
- F. Wash hands
- G. Prepare solution and tubing as outlined in Job Sheet #1, Unit VI
- H. Prepare wing-tipped needle as outlined in Job Sheet #5, Unit VI
- I. Place tubing and needle in a convenient location

    (NOTE: The clamp must be easily accessible for quickly establishing flow rate.)

- J. Choose an approximate insertion site

JOB SHEET #7

K. Apply tourniquet as outlined in Job Sheet #1

L. Fill veins as outlined in Job Sheet #2

M. Choose appropriate vein

N. Palpate chosen vein as outlined in Job Sheet #4

O. Prepare insertion site as outlined in Job Sheet #5

P. Open 2x2 and place in a convenient location

EXAMPLE: Bedside table

(NOTE: Keep the inside of packaging sterile.)

Q. Open antimicrobial ointment and place on side of gauze 2x2 packaging opposite 2x2

R. Prepare tape as outlined in Job Sheet #8

S. Remove protective cap from needle

T. Inspect needle for flaws

U. Hold wing-tipped needle by pinching wings together with first finger and thumb of dominant hand

(NOTE: The bevel of the needle must face up.)

V. Use first finger or thumb of nondominant hand to pull skin taut below chosen vein

(NOTE: Make sure that this finger is well below the insertion site.)

W. Hold bevel of needle directly over vein at an angle of about 10 degrees from skin

X. Pierce skin and vein in one smooth motion

(NOTE: There should be an immediate backflow of blood into tubing as soon as the vein is entered.)

(CAUTION: Never make more than two unsuccessful attempts at venipuncture on a patient. If two attempts are unsuccessful, get a more experienced nurse to perform venipuncture.)

Y. As soon as you see blood return, lift needle slightly and advance needle completely into the vein

Z. Release tourniquet

JOB SHEET #7

AA. Establish IV solution flow

(NOTE: This flow should be rapid for a couple of seconds to clear the wing-tipped needle of blood.)

BB. Proceed with taping and dressing as outlined in Job Sheet #8

(NOTE: As IV therapy is continued and IV site is changed, alternate arms with each venipuncture.)

VENIPUNCTURE PROCESS
UNTI VIII

JOB SHEET #8--TAPE AND DRESS A WING-TIPPED NEEDLE

(NOTE: The procedure outlined in this job sheet may be altered with personal preference, experience, and individual patient requirements.)

I. Equipment and materials

   A. Sterile gauze sponge (2x2 preferred)

      (NOTE: Do not use a Band-Aid. A Band-Aid does not provide adequate stability for the needle.)

   B. Antimicrobial ointment

      (NOTE: There is controversy concerning the use of antimicrobial ointment. Know and follow your institution's policy.)

   C. Tape, 1 inch wide

II. Procedure

   A. Follow preparation for venipuncture using wing-tipped needle as outlined in Job Sheet #7

   B. Tear or cut six pieces of tape, 4 to 6 inches each, and place where readily accessible

      (NOTE: Question patient regarding history of allergy to tape. If the patient has an allergy to tape, use paper tape. If patient is not allergic, use whichever kind of tape your institution provides.)

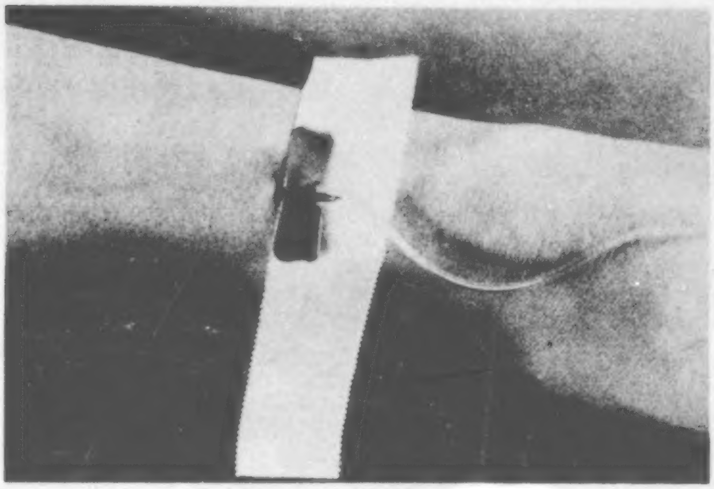
   C. Perform venipuncture technique using wing-tipped needle as outlined in Job Sheet #7

JOB SHEET #8

D. Lift needle wings slightly and place first piece of tape (sticky side up) under wings (Figure 13)

(CAUTION: Be very careful when manipulating a wing-tipped needle. The bevel of the needle can easily pierce the vein wall.)

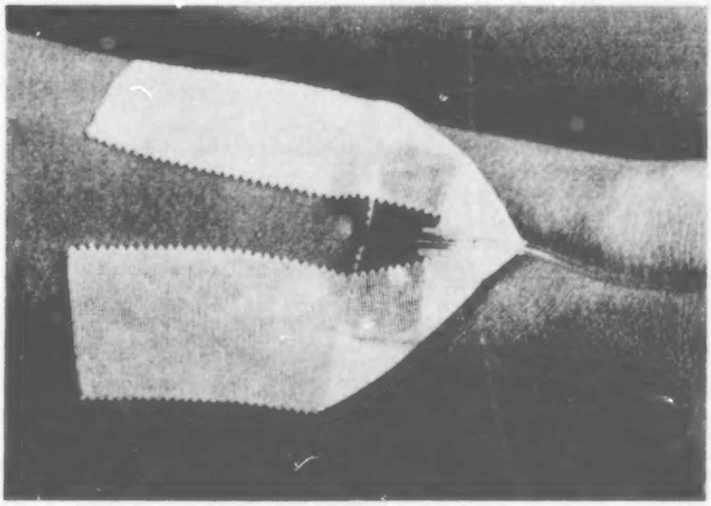
FIGURE 13



E. Fold tape up over wings (Figure 14)

(NOTE: This puts the sticky part of the tape over the wings and on the skin.)

FIGURE 14



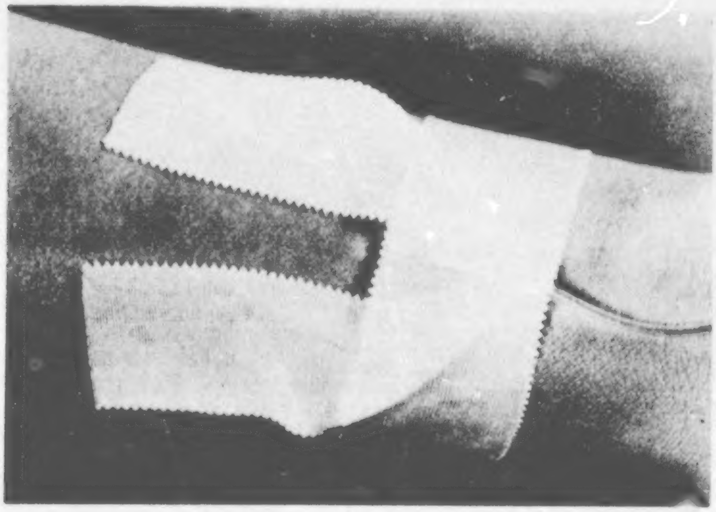
JOB SHEET #8

F. Place second piece of tape directly over wings (Figure 15)

(NOTE: Do not cover insertion site with this piece of tape.)

(CAUTION: Tape should never be wrapped completely around the arm.)

FIGURE 15



G. Place small amount of antimicrobial ointment over insertion site and cover with 2x2

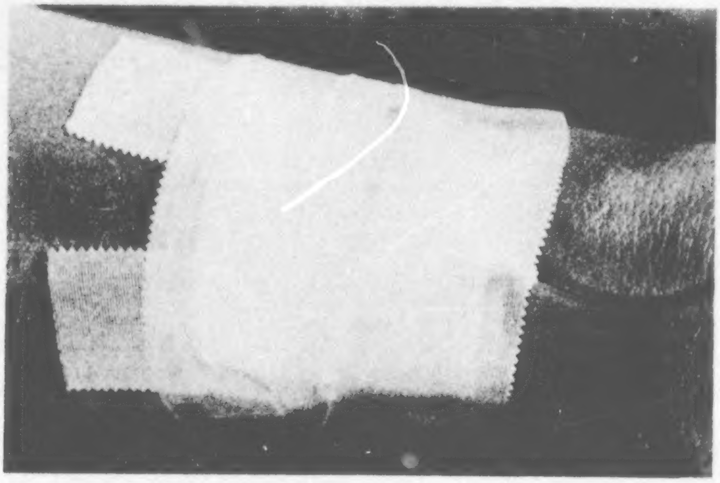
(CAUTION: Cover only about 1/2 inch of skin above insertion site with gauze sponge. If 2x2 is placed too far above insertion site, it could cover the early signs of phlebitis.)

JOB SHEET #8

H. Place third and, if necessary, fourth piece of tape over 2x2 (Figure 16)

(NOTE: Cover 2x2 completely with tape to make an air-occlusive dressing.)

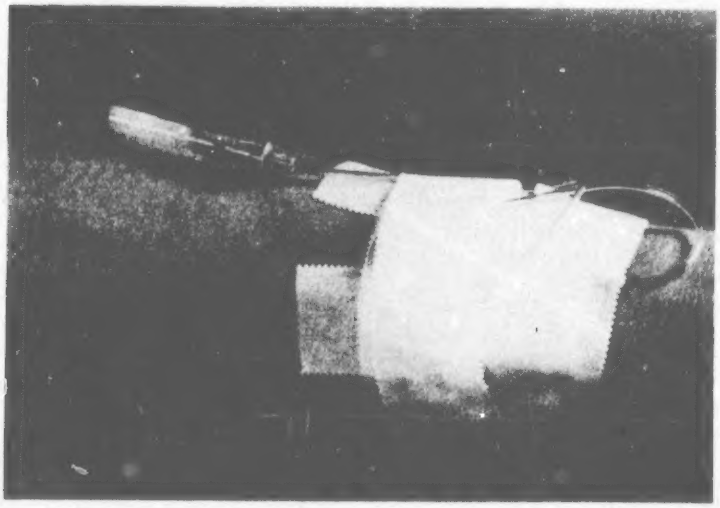
FIGURE 16



I. Loop plastic needle tubing upward; curl this tubing beside or above insertion site and secure with tape (Figure 17)

(CAUTION: When taping the needle tubing, make sure not to kink tubing where it is attached to wings.)

FIGURE 17



JOB SHEET #8

J. Write information required for labeling site on a piece of tape and place over needle and tubing near loop (Figure 19)

(NOTE: Additional tape can be added at nurse's discretion. Be sure to tape the connection made by the IV tubing into the needle hub.)

(CAUTION: Leave the needle tubing that comes out of the wings uncovered to observe for blood return.)

K. Wash hands before leaving room

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #9 PERFORM VENIPUNCTURE USING AN OVER-THE-NEEDLE CATHETER

I. Equipment and materials

A. Appropriate IV solution

B. Appropriate IV tubing

C. Appropriate size ONC

D. Tourniquet

E. Prep sponges

1. Betadine or provodine iodine

2. Alcohol

F. Gauze 2x2

G. Tape

II. Procedure

A. Identify patient's need for IV therapy by using appropriate communication tool

B. Obtain equipment and take to room

C. Identify yourself to patient and/or family

D. Identify patient

E. Explain procedure to patient

(NOTE: Question patient regarding allergy to plastic catheter. If patient has history of allergy, use a wing-tipped needle.)

F. Wash hands

G. Prepare solution and tubing as outlined in Job Sheet #1, Unit VI

H. Place tubing in a convenient location

(NOTE: Easy access to the tubing and clamp is essential for quick insertion into tubing and establishment of flow.)

I. Pick an approximate insertion site

J. Apply tourniquet as outlined in Job Sheet #1

JOB SHEET #9

K. Fill veins as outlined in Job Sheet #2

L. Choose appropriate vein

M. Palpate chosen vein as outlined in Job Sheet #4

N. Prepare insertion site as outlined in Job Sheet #5

O. Open 2x2 and place in a convenient location

EXAMPLE: Bedside table

(NOTE: Keep inside of packaging sterile.)

P. Open antimicrobial ointment and place on side of 2x2 packaging opposite 2x2

Q. Prepare tape as outlined in Job Sheet #8

R. Remove protective cap from catheter

S. Inspect stylet and catheter for flaws

T. Hold catheter, bevel up, in dominant hand with thumb and first finger

(NOTE: Hold the catheter in such a way as to see an immediate blood return.)

U. With first finger or thumb of nondominant hand, pull the skin taut below choosen vein

(NOTE: Make sure that this finger is well below the insertion site.)

V. Hold bevel of needle parallel to one side of the vein at an angle of 30 to 45 degrees

W. Pierce skin about 1/2 inch below planned insertion site

X. Angle catheter slightly toward vein

Y. Pierce vein, watching for a backflow of blood

(CAUTION: Never make more than two unsuccessful attempts at venipuncture on a patient. If two attempts are unsuccessful, get a more experienced nurse to perform venipuncture.)

Z. Lift catheter slightly as soon as you see a backflow of blood

AA. Advance catheter another 1/8 inch

BB. Holding catheter stylet stationary with dominant hand, advance catheter completely into vein, using nondominant hand

JOB SHEET #9

CC. Remove stylet

(NOTE: Immediately place stylet somewhere away from the bed, such as on the bedside table. If multiple venipuncture attempts are made, account for every stylet from each catheter used and dispose of properly.)

DD. Release tourniquet

EE. Establish IV solution flow

(NOTE: To clear the catheter of blood, this flow should be rapid for 2 or 3 seconds.)

FF. Proceed with taping and dressing as outlined in Job Sheet #10

(NOTE: As IV therapy is continued and the IV site is changed, alternate arms with each venipuncture.)

VENIPUNCTURE PROCESS
UNIT VIII

JOB SHEET #10--TAPE AND DRESS AN OVER-THE-NEEDLE CATHETER

(NOTE: The procedure outlined in this job sheet may be altered with personal preference, experience, hospital policy, and individual patient requirements.)

I. Equipment and materials

   A. Sterile gauze sponge (2x2 preferred)

      (NOTE: Do not use a Band-Aid. A Band-Aid does not provide adequate stability for the catheter.)

   B. Antimicrobial ointment

      (NOTE: There is controversy concerning the use of antimicrobial ointment. Know and follow your institution's policy.)

   C. Tape, 1/2-inch and 1-inch widths

II. Procedure

   A. Follow preparation for venipuncture using ONC as outlined in Job Sheet #9

   B. Prepare tape

      (NOTE: Question patient regarding history of allergy to tape. If the patient has an allergy to tape, use paper tape. If patient is not allergic, use whichever kind of tape your institution provides.)

      1. Tear or cut two pieces of 1/2-inch tape

         (NOTE: If the hub of the needle is exceptionally short [as it is with some Jelco brand needles], this tape should be 1/4- to 3/8-inch wide.)

      2. Tear or cut six pieces of 1-inch tape

   C. Place tape where readily accessible

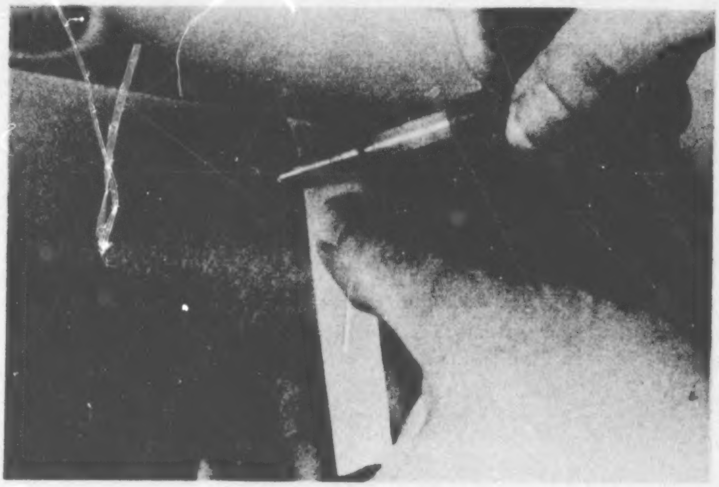
   D. Perform venipuncture technique using ONC as outlined in Job Sheet #9

JOB SHEET #10

E. Lift hub of catheter and place a strip of 1/2-inch tape (sticky side up) underneath (Figure 18)

(NOTE: To facilitate needle stability and ease when changing IV tubing, make sure this piece of tape is only on hub.)

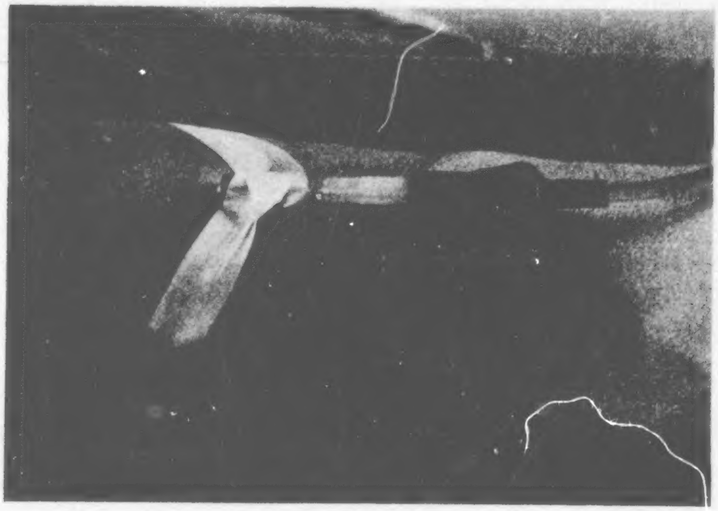
FIGURE 18



F. Fold tape up over hub in an open Y-shape or chevron (Figure 19)

(NOTE: Leave insertion site uncovered, and pinch tape tightly around the catheter hub.)

FIGURE 19

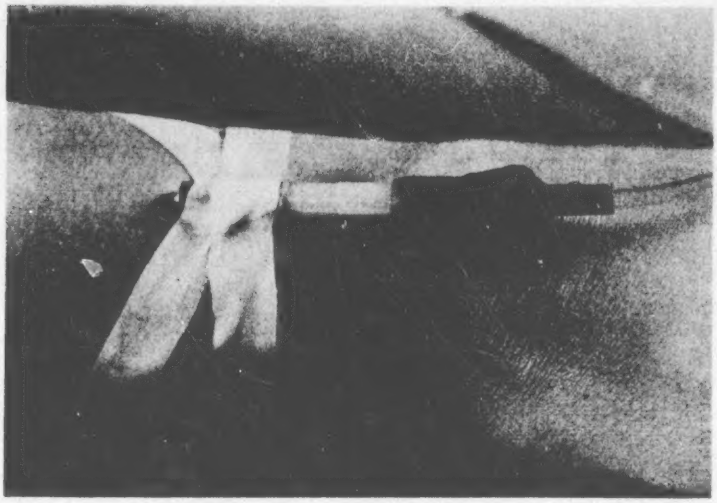


JOB SHEET #10

G. Place second piece of 1/2-inch tape (sticky side down) over hub of catheter (Figure 20)

(NOTE: Leave insertion site uncovered. To facilitate needle stability and ease when changing IV tubing, make sure this piece of tape is only on hub. Pinch tape tightly around the catheter hub.)

FIGURE 20



JOB SHEET #10

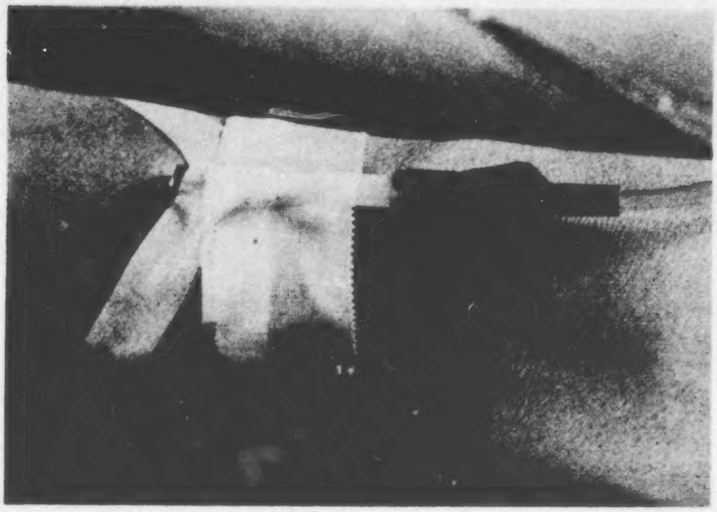
H. Place first piece of 1-inch tape over both catheter hub and IV tubing (Figure 21)

(NOTE: Do not wrap tape completely around the arm. This piece of tape secures the IV tubing into the catheter hub. Pinch the tape tightly around the catheter hub and IV tubing.)

(CAUTION: If there is a hard connection on the female adapter of the IV tubing, place another 2x2 under this adapter to protect and pad the skin.)

EXAMPLE: IVAC tubing

FIGURE 21



I. Place second piece of 1-inch tape approximately 1/2 inch below first piece of tape

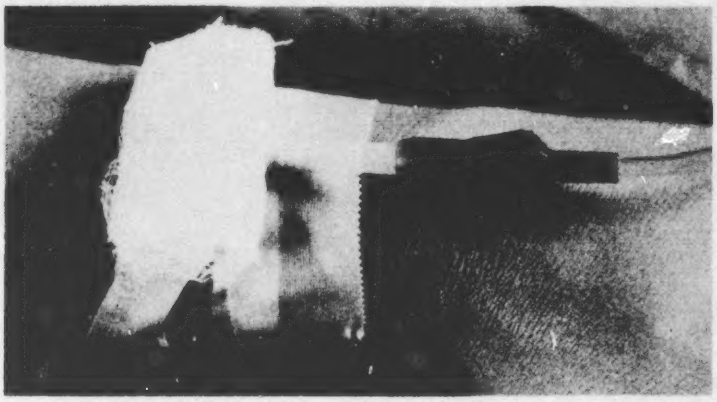
(NOTE: This piece of tape further secures the tubing into the catheter hub.)

JOB SHEET #10

J. Place a small amount of antimicrobial ointment over insertion site and cover with 2x2 (Figure 22)

(CAUTION: Cover only about 1/2 inch of skin above insertion site with 2x2. If 2x2 is placed too far above the insertion site, it could cover the early signs of phlebitis.)

FIGURE 22



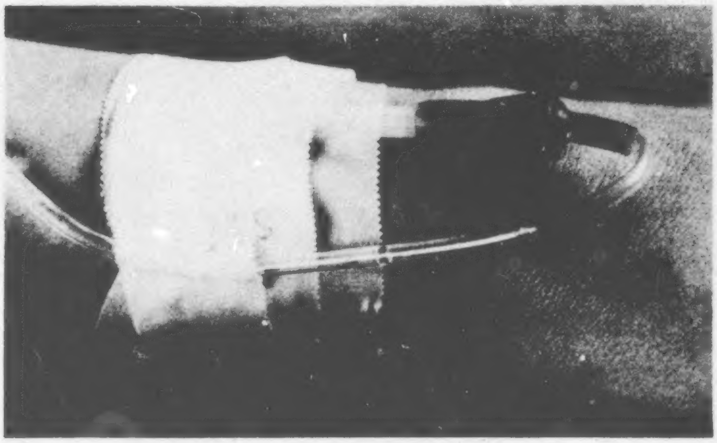
K. Secure 2x2 with tape

(NOTE: Cover 2x2 completely with tape to make an air-occlusive dressing.)

L. Loop IV tubing upward and secure with tape (Figure 23)

(CAUTION: When making this loop, be sure not to kink the tubing. However, do not make a large loop that can be caught on equipment or covers.)

FIGURE 23



JOB SHEET #10

M. Write information required for labeling site on a piece of tape, and use this piece of tape to secure tubing beside insertion site

(NOTE: Additional tape may be added at nurse's discretion.)

(CAUTION: Never cross the tubing over the insertion site.)

N. Wash hands before leaving room

VENIPUNCTURE PROCESS
UNIT VIII

TEST

NAME__________________________________ SCORE__________________

1. Match the terms associated with venipuncture to their correct definitions. Write the correct numbers in the blanks.

______a. Eager to fight

______b. Hinder; to keep from moving or acting freely

______c. Amount of variation allowed from a standard

______d. Outline or surface configuration of a part

______e. Sharp, pointed device

______f. To bar or hinder the progress of

______g. To examine by touching

______h. To make susceptible; to make receptive beforehand

______i. Substance that makes something impure

______j. Full of twists and turns; winding; crooked

______k. Collection of fluids in a body part; caused by body part being lower than the rest of the body

______l. Angled surface

______m. Substance that causes change

______n. An increase or addition in number, size, or volume

______o. Prevailing; most used

______p. Soft, flexible intravenous catheter, closely fitted over a stylet

______q. To clean or empty by a flow of solution

______r. Stretched tightly

______s. Working against organisms such as bacteria

______t. Place where vein has two branches; fork

______u. Inside opening of a tube

1. Dominant
2. Lumen
3. Contaminant
4. Palpate
5. Contour
6. Predispose
7. Hamper
8. Dependent edema
9. Combative
10. Flush
11. Increment
12. Tolerance
13. Taut
14. Impede
15. Tortutous
16. Antimicrobial
17. Agent
18. Bevel
19. Stylet
20. Over-the-needle catheter (ONC)
21. Bifurcation

TEST

2. Discuss considerations for selection of insertion site.

   a. Length of therapy--______________________________

   ____

   b. Type of needle or catheter chosen--______________________________

   ____

   c. Type of solution prescribed--______________________________

   ____

   d. Size of needle or catheter required--______________________________

   ____

   e. Condition of insertion site--______________________________

   ____

   f. Infusion rate prescribed--______________________________

   ____

   ____

3. Arrange in order steps for preparation and performance of venipuncture. Write a "1" before the first step, a "2" before the second step, and so on. Steps are continued on the next page.

   _____a. Obtain appropriate equipment and take to room

      1) Take to room only equipment needed

      2) Take all needed equipment into room at same time

   _____b. Apply tourniquet

   _____c. Identify patient's need for IV therapy

   _____d. Wash hands

   _____e. Prepare tape, ointment, and dressing

   _____f. Identify patient

   _____g. Prepare equipment

   _____h. Explain procedure to patient

   _____i. Perform venipuncture

TEST

_____j. Collect data for nursing history

_____k. Dress and tape needle/catheter and tubing properly

_____l. Select prescribed IV solution

_____m. Fill and choose vein

_____n. Prepare insertion site

_____o. Palpate vein

4. Discuss reasons for using splints.

____

____

____

____

____

5. State guidelines for choosing a splint.

   a. ____

   ____

   b. ____

   ____

6. Describe positioning and taping of hand or arm on splint.

   a. Wrist with insertion site in hand or top of wrist--_______________

   ____

   ____

   ____

   ____

   ____

   b. Wrist with insertion site on underside of wrist--_______________

   ____

   ____

   ____

   ____

TEST

c. Elbow-- ____________________

____

____

____

____

____

7. State nursing interventions with regard to using splints.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

8. Discuss rules for using restraints.

____

____

____

____

____

9. Arrange in order steps in establishing prescribed flow rate. Write a "1" before the first step, a "2" before the second step, and so on.

______a. Set rate as prescribed by doctor's order

______b. Calculate flow rate and regulate drops per minute when using gravity and clamp system

______c. Open flow-control clamp to a rapid flow for 2 to 3 seconds to flush needle/catheter of blood

10. State steps used to calculate flow rates.

a. ____________________

b. ____________________

c. ____________________

TEST

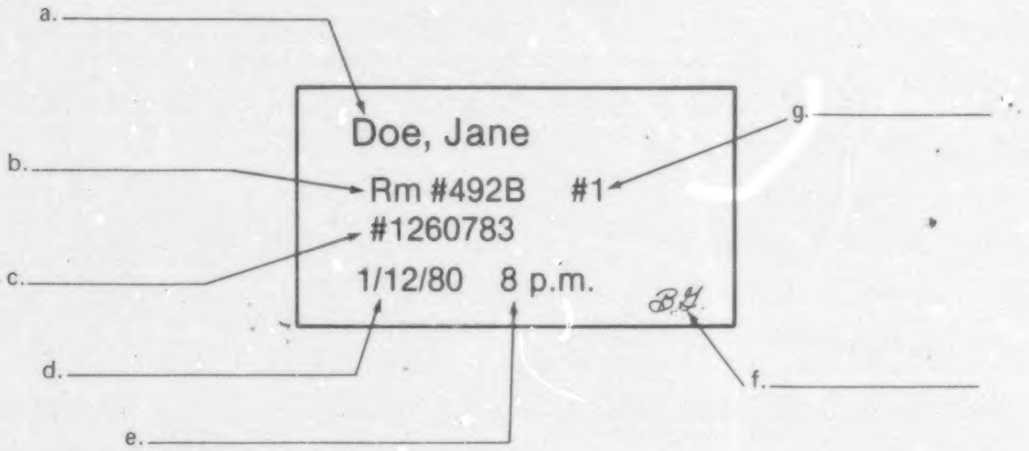
d. ______________________________

e. ______________________________

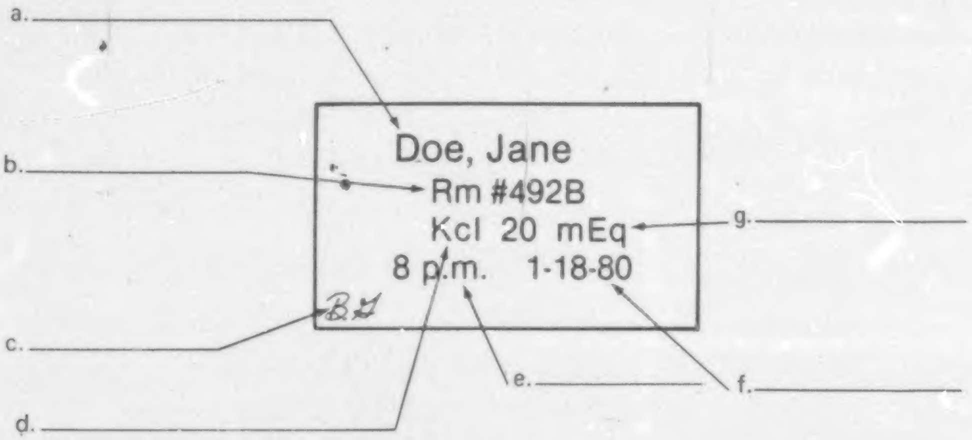
f. ______________________________

11. Label information required on container and tubing, and at insertion site.

Container Label

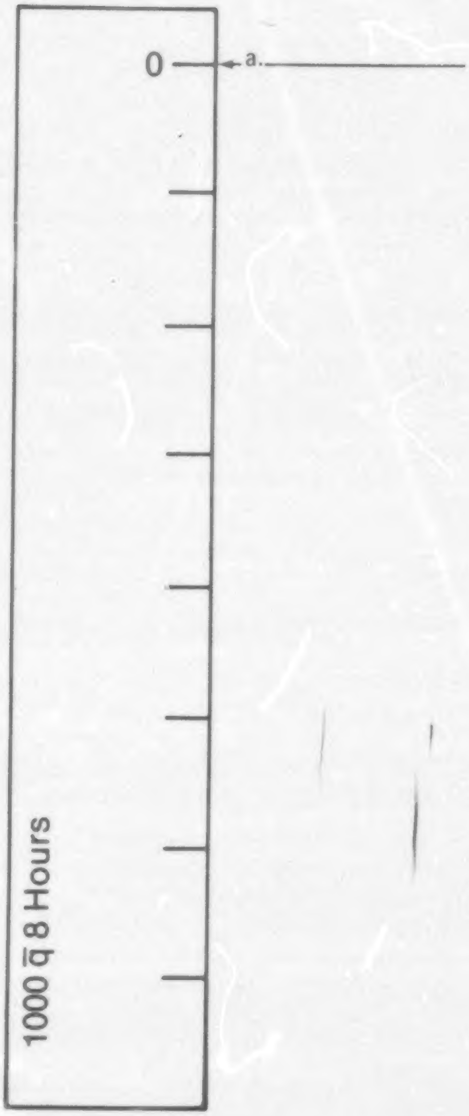


Medication-Added Label

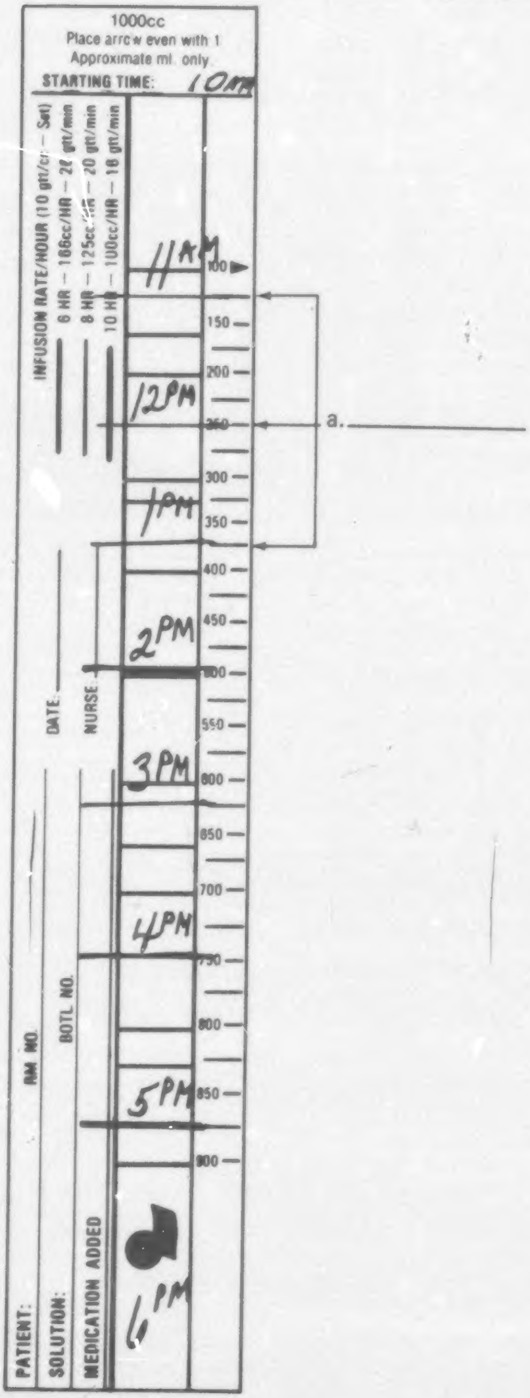


TEST

Master Timing Strip

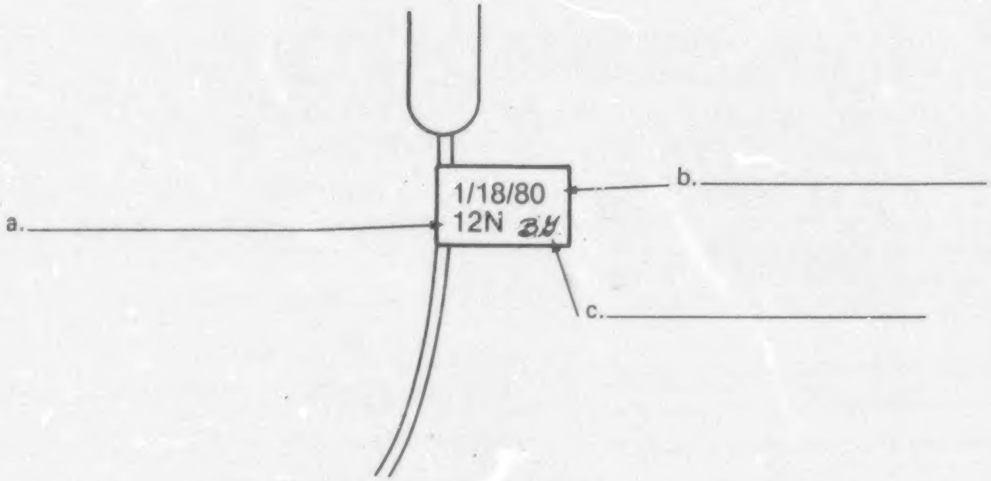


Manufactured Timing Strip

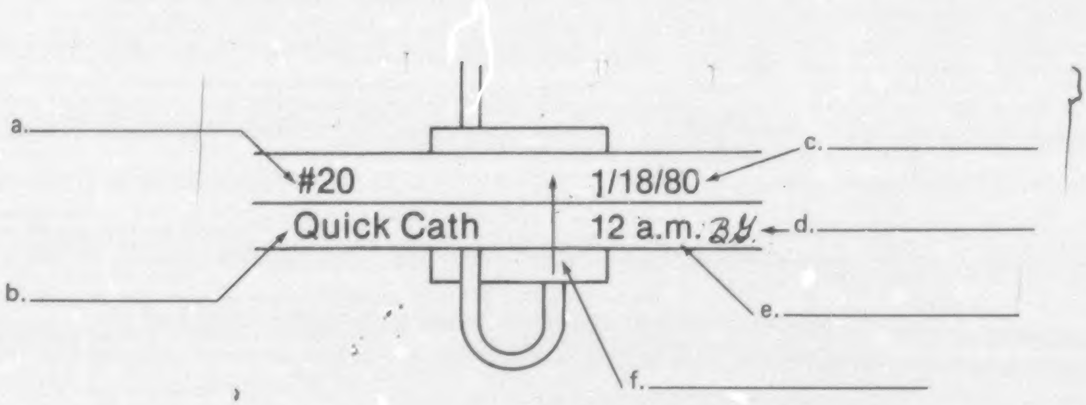


TEST

IV Tubing Label



IV Site Label



TEST

12. Discuss the documentation of venipuncture.

    a. Nurses notes-- ______________________________

    ____

    ____

    ____

    ____

    ____

    b. Medication sheet or IV sheet-- ______________________________

    ____

    ____

    ____

(NOTE: Test questions 13-15 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

13. Calculate flow rates.

14. Document venipuncture process.

15. Demonstrate the ability to

    a. Apply a tourniquet.

    b. Use techniques for filling veins.

    c. Identify vein in an edematous arm.

    d. Palpate a vein.

    e. Prepare the insertion site.

    f. Remove catheter and/or needle from packaging and inspect.

    g. Perform venipuncture using a wing-tipped needle.

    h. Tape and dress a wing-tipped needle.

    i. Perform venipuncture using an over-the-needle catheter.

    j. Tape and dress an over-the needle catheter.

VENIPUNCTURE PROCESS
UNIT VIII

ANSWERS TO TEST

1. a. 9
   b. 7
   c. 12
   d. 5
   e. 19
   f. 14
   g. 4
   h. 6
   i. 3
   j. 15
   k. 8
   l. 18
   m. 17
   n. 11
   o. 1
   p. 20
   q. 10
   r. 13
   s. 16
   t. 21
   u. 2

2. Discussion should include the following
   a. Length of therapy
      1) For short-term therapy, use hand or arm of nondominant side
      2) For long-term therapy, start low on extremity
   b. Type of needle or catheter chosen
      1) Wing-tipped needle requires a relatively flat and stable site
      2) Over-the-needle catheter (ONC) may be used at any site including an area of flexion
   c. Type of solution prescribed
      1) Highly irritating solutions require a large blood flow to dilute solution rapidly
      2) Viscous solutions require a large vein to accomodate the larger needle or catheter required
   d. Size of needle or catheter
      1) Viscous solutions usually require 16- to 20-gauge needle or catheter
      2) Simple solutions can be infused with a small needle

ANSWERS TO TEST

e. Condition of insertion site--Avoid areas of infection, irritation, or injury

f. Infusion rate prescribed

    1) Large volumes of fluid over short periods of time require a large needle or catheter in a large vein

    2) Small volumes of fluid over long periods of time can be given through small needles or catheters in small veins

3. a. 6
   b. 9
   c. 1
   d. 7
   e. 13
   f. 2
   g. 8
   h. 4
   i. 14
   j. 3
   k. 15
   l. 5
   m. 10
   n. 12
   o. 11

4. Discussion should include the following

   a. To hinder movement of joint

   b. To prevent telescoping of catheter or needle

   c. To prevent bending of catheter

   d. To provide a flat, stable area for a wing-tipped needle

5. a. Insertion site in hand or wrist requires a short splint

   b. Insertion site at brachial area of elbow requires a long splint

6. Description should include the following

   a. Wrist with insertion site in hand or top of wrist

      1) Place palm down and curl fingers over end of board

      2) Place tape, sticky side down, under tubing and over knuckles, leaving thumb free

      3) Place double-faced tape over arm approximately 2 inches from end of splint

   b. Wrist with insertion site on underside of wrist

      1) Place palm up on board

ANSWERS TO TEST

2) Place tape, sticky side down, over palm of hand

3) Place double-faced tape over arm approximately 2 inches from end of splint

c. Elbow

1) Place palm down with fingers curled over end of board

2) Place tape, sticky side down, over top of hand

3) Place double-faced tape at mid-level of forearm

4) Place double-faced tape at least 3 to 4 inches above elbow and at least 2 inches from end of board

7. a. Remove splint at least once per shift

b. Provide slight exercise of the joint or joints if possible

c. Keep extremity elevated

d. Check tape at intervals

8. Discussion should include the following

a. May be required if the patient is restless, confused, combative, or uncooperative

b. Must be carefully applied to prevent restriction of IV flow or patient's circulation

c. Should be tied to bed frame, not rail

d. Should be tied downward toward foot of bed

e. Should allow arm to be kept slightly elevated

9. a. 3

b. 2

c. 1

10. a. Determine amount of solution ordered by doctor

b. Determine solution delivery time

c. Divide amount of solution by delivery time to find hourly delivery rate

ANSWERS TO TEST

d. Determine drip factor (drops per milliliter) of IV tubing

e. Find number of drops per minute by dividing drip system drops per milliliter by 60 seconds per minute, and multiplying by amount of fluid per hour over 1

f. When using microdrip system, simply set the drop rate at the number of milliliters per hour

11. **Container Label**

a. Patient's name

b. Room number and bed number

c. Hospital identification number

d. Date hung

e. Time hung

f. Nurse's initials or name

g. Container number

Medication-Added Label

a. Patient's name

b. Room number and bed number

c. Nurse's initials or name

d. Medication added

e. Time added

f. Date added

g. Dosage

Master Timing Strip--Reference point

Manufactured Timing Strip--Prescribed ml/hr increments, such as 125 ml/hr

IV Tubing Label

a. Time hung

b. Date hung

c. Nurse's initials or name

ANSWERS TO TEST

IV Site Label

- a. Catheter or needle size
- b. Brand name of needle/catheter
- c. Date of insertion
- d. Nurse's initials or name
- e. Time of insertion
- f. Arrow indicating direction of catheter when ONC is used

12. Discussion should include the following
    - a. Nurses notes
        - 1) Patient's understanding of procedure
        - 2) Brand name and size of needle or catheter
        - 3) Insertion site
        - 4) Patient's tolerance of procedure
        - 5) Use of splints or restraints
        - 6) Instructions given to patient
        - 7) Flow rate
    - b. Medication sheet or IV sheet
        - 1) Solution hung
        - 2) Date and time hung
        - 3) Additives
        - 4) Volume hung

13. Evaluated to the satisfaction of the instructor

14. Evaluated to the satisfaction of the instructor

15. Performance skills evaluated to the satisfaction of the instructor

PROBLEMS AND COMPLICATIONS
UNIT IX

UNIT OBJECTIVE

After completing this unit, the student should be able to identify and perform proper nursing interventions for problems and complications related to IV therapy. This knowledge will be shown by completing the assignment sheet, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match to their correct definitions terms associated with IV problems and complications.
2. Distinguish between general classifications of IV problems and complications.
3. Discuss hematoma as related to IV therapy.
4. Select from a list nursing responsibilities and interventions with regard to hematomas.
5. Discuss infiltration.
6. List signs of infiltration.
7. State reasons for preventing infiltration.
8. Select from a list nursing responsibilities and interventions with regard to infiltration.
9. Discuss thrombus formation.
10. State the sign of thrombus formation.
11. Select from a list nursing responsibilities and interventions with regard to thrombus formation.
12. Discuss phlebitis.
13. List signs of phlebitis.
14. List factors contributing to phlebitis.
15. Select from a list nursing responsibilities and interventions with regard to phlebitis.
16. Distinguish between local and systemic allergic reactions.
17. List signs and symptoms of local and systemic reactions.
18. Match types of allergic reactions to correct nursing responsibilities and interventions.

OBJECTIVE SHEET

19. Discuss pyrogenic reactions.

20. List signs and symptoms of pyrogenic reactions.

21. Select from a list nursing responsibilities and interventions with regard to pyrogenic reactions.

22. Discuss types of emboli.

23. List signs of pulmonary, air, and catheter emboli.

24. Match types of emboli to correct nursing responsibilities and interventions.

25. Discuss pulmonary edema.

26. List signs of pulmonary edema.

27. Select from a list nursing responsibilities and interventions with regard to pulmonary edema.

28. Discuss speed shock.

29. List signs and symptoms of speed shock.

30. Select from a list nursing responsibilities and interventions with regard to speed shock.

31. Evaluate specific situations for problems or complications of IV therapy.

32. Demonstrate the ability to

    a. Confirm placement and patency of over-the-needle catheter.

    b. Confirm placement and patency of wing-tipped needle.

    c. Confirm placement and patency of wing-tipped heparin lock.

    d. Reestablish prescribed flow rate.

    e. Perform proper nursing interventions for sudden onset of infectious process that may have been caused by IV system.

    f. Perform proper nursing interventions for sudden onset of respiratory distress that may have been caused by IV system.

    g. Perform proper nursing interventions for syncope that may have been caused by IV system.

    h. Perform proper nursing interventions for respiratory distress that may have been caused by fluid overload.

PROBLEMS AND COMPLICATIONS
UNIT IX

SUGGESTED ACTIVITIES

I. Suggested activities

   A. Obtain March, 1981, issue of *RN*, which has some excellent photographs of complications on pages 38 and 39.

   B. Pretest students to assess their present knowledge of subject.

   C. Provide students with objective sheet.

   D. Provide students with information, assignment, and job sheets.

   E. Discuss unit and specific objectives.

   F. Discuss information and assignment sheets.

   (NOTE: When discussing Objective 5, illustrate partial and complete infiltration on chalkboard.)

   G. Individualize instruction for students with special needs.

   H. Refer students to procedure for discontinuing an IV in Unit X and to IV medications in Unit XI before demonstrating and discussing procedures outlined in job sheets.

   I. Share personal experiences as they relate to specific problems or complications.

   J. Give test.

   K. Discuss test.

   L. Reteach if necessary.

II. Instructional materials

   A. Objective sheet

   B. Suggested activities

   C. Information sheet

   D. Assignment Sheet #1--Evaluate Specific Situations for Problems or Complications of IV Therapy

   E. Answers to assignment sheet

   F. Job sheets

      1. Job Sheet #1--Confirm Placement and Patency of Over-the-Needle Catheter

SUGGESTED ACTIVITIES

2. Job Sheet #2--Confirm Placement and Patency of Wing-Tipped Needle
3. Job Sheet #3--Confirm Placement and Patency of Wing-Tipped Heparin Lock
4. Job Sheet #4--Reestablish Prescribed Flow Rate
5. Job Sheet #5--Perform Proper Nursing Interventions for Sudden Onset of Infectious Process that May Have Been Caused by IV System
6. Job Sheet #6--Perform Proper Nursing Interventions for Sudden Onset of Respiratory Distress that May Have Been Caused by IV System
7. Job Sheet #7--Perform Proper Nursing Interventions for Syncope that May Have Been Caused by IV System
8. Job Sheet #8--Perform Proper Nursing Interventions for Respiratory Distress that May Have Been Caused by Fluid Overload

G. Test

H. Answers to test

III. Unit references

A. Aisenstein, Terry Jo. "Those All-Too-Common IV Complications, and the Simple Steps You Can Take to Avoid Them." *RN*, Vol. 44, No. 3 (March, 1981), pp. 38-41.

B. Beideman, Mary Ellen, et al. "A Clinical Overview Study of Infusion Phlebitis." *American Journal of IV Therapy and Clinical Nutrition*, Vol. 6, No. 2 (February/March, 1979), pp. 23-24.

C. Blust, Jeanne E. "Preventing Hematomas after Venipuncture." *American Journal of Nursing*, Vol. 78, No. 10 (October, 1978), pp. 1675-1676.

D. Blust, Jeanne E., and Norma Bukva Manos. "Fundamentals of IV Maintenance." *American Journal of Nursing*, Vol. 79, No. 7 (July, 1979), pp. 1274-1287.

E. Dossey, Barbara, and Joanne Mary Passons. "Pulmonary Embolism: Preventing It, Treating It." *Nursing81*, Vol. 11, No. 3 (March, 1981), pp. 26-33.

F. Masoorlie, Susan. "Troubles with IVs: Try These Tips and Techniques." *Nursing78*, Vol. 8, No. 10 (October, 1978), pp. 78-84.

G. Plumer, Ada L. *Principles and Practices of IV Therapy*, 2nd ed. Boston: Little, Brown & Co., 1970.

H. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management.* Philadelphia: J. B. Lippincott, 1980.

SUGGESTED ACTIVITIES

I. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary*, 14th ed. Philadelphia: F. A. Davis Co., 1981.

J. West, Richard Samuel, ed. *Managing IV Therapy*, Photobook Series. Horsham, Pennsylvania: Intermed Communications, Inc., 1980.

IV. Recommended reading

A. Aspinall, Mary Jo. "Scoring Against Nosocomial Infections." *American Journal of Nursing*, Vol. 78, No. 10 (October, 1978), pp. 1704-1707.

B. Shultz, Klaus. "Treating Pulmonary Edema." *Nursing78*, Vol. 8, No. 2 (February, 1978), pp. 42-46.

PROBLEMS AND COMPLICATIONS
UNIT IX

INFORMATION SHEET

I. Terms and definitions

   A. Aseptic--Free from disease-producing microorganisms

   B. Auscultate--Listen to

   C. Composition--Mixture of several parts or ingredients; the makeup of an object or person

   D. Contract--To reduce in size; draw together

   E. Cyanosis--Bluish skin color caused by lack of oxygen in the blood

   F. Embolus--Foreign matter carried in the blood

   G. Necrosis--Death of tissue

   H. Patency--State of being freely open; unobstructed

   I. Predispose--To make susceptible; to make receptive beforehand

      EXAMPLE: Fatigue *predisposes* one to illness.

   J. Pyrogen--Foreign protein such as bacteria or fungus

   K. Rale--Bubbling sound heard when listening to lungs

   L. Ronchi--Wheezing sound heard when listening to lungs

   M. Sensitivity--Reaction to a substance; may be local or systemic

   N. Syncope--Fainting caused by inadequate blood flow to brain

   O. Systemic--Affecting the body as a whole

   P. Tortuous--Full of twists and turns; winding; crooked

   Q. Toxic--Poisonous

   R. Traumatize--To subject to injury

   S. Ventricular gallop--Sound resembling gallop of a horse; heard when listening to the heart

INFORMATION SHEET

II. General classifications of IV problems and complications

  A. Local

  (NOTE: Local problems and complications occur more frequently than systemic ones but are less serious. They are seldom life-threatening.)

    1. Hematoma
    2. Infiltration
    3. Thrombus formation
    4. Phlebitis
    5. Allergic reactions

  B. Systemic

  (NOTE: Systemic problems and complications occur less frequently than local ones, but they are more serious. They can be life-threatening.)

    1. Allergic reactions
    2. Pyrogenic reactions
    3. Pulmonary embolus
    4. Air embolus
    5. Catheter embolus
    6. Pulmonary edema
    7. Speed shock

III. Hematoma as related to IV therapy

  A. Is fairly common

  B. Can vary in size

  C. Can vary in degree of pain

  (NOTE: The pain varies according to the size.)

  D. Is caused by bleeding from vein into surrounding tissue

  E. Will leave a bruise

  F. Usually occurs when needle or catheter is removed

INFORMATION SHEET

IV. Nursing responsibilities and interventions with regard to hematomas

- A. Use pressure over insertion site immediately after withdrawal of catheter or needle

  (NOTE: Pressure must be applied until bleeding has stopped.)

- B. Use ice pack over large and/or painful areas for first twenty-four hours

  (NOTE: Check your hospital's policy for the use of an ice pack. Some hospitals may require a doctor's order.)

  (CAUTION: The use of an ice pack must be on an intermittent basis, and the skin must be protected to prevent the possibility of tissue damage [frostbite].)

- C. Use warm, moist compress after first twenty-four hours

- D. Encourage gentle exercise

  (NOTE: Gentle exercise promotes quicker reabsorption of the blood.)

- E. Document all of your assessments, observations, and actions on the appropriate chart form

V. Infiltration

- A. Is one of the most common complications of IV therapy

- B. Is an infusion of IV solution and/or medication into surrounding tissue

- C. Is caused by dislodgement of IV needle or catheter outside lumen of vein

  1. Partial--Occurs when only a portion of needle or catheter tip lies outside lumen of vein

     (NOTE: Partial infiltration occurs mainly when an ONC is used.)

  2. Complete--Occurs when bevel or tip of needle or catheter lies completely outside lumen of vein

     (NOTE: Complete infiltration occurs with equal frequency when wing-tipped needles and ONCs are used.)

- D. Can be extensive if skin is loosely attached to underlying tissue

  (NOTE: Extensive infiltration is usually found in cases involving elderly patients or when patients are dehydrated.)

- E. Can be extensive if infusion pump is used

  (NOTE: The pump will continue to deliver the solution and/or medication until the pressure exceeds the machine's preset level.)

INFORMATION SHEET

VI. Signs of infiltration

(NOTE: Early infiltration is not always easy to recognize.)

A. Edema at or near insertion site

B. Coolness at and around insertion site

C. Sluggish flow with no obvious reason

(NOTE: Some reasons for a sluggish flow when the IV is not infiltrated are needle or catheter tip against a bifurcation, spasms of vein, needle or catheter size too small for solution being infused, and needle or catheter tip or bevel against wall of vein.)

D. Burning and/or pain at insertion site

E. Leaking of fluid at site

VII. Reasons for preventing infiltration

A. Can cause actual tissue damage and necrosis

(NOTE: Many of the solutions and medications in use today are very irritating.)

EXAMPLES: KCl, dopamine, Levophed

B. Can prevent use of infiltrated extremity for further IV therapy for many days

C. Is very painful if extensive

D. Predisposes infiltrated extremity to infection

E. Prevents infusion of prescribed volume of solution

VIII. Nursing responsibilities and interventions with regard to infiltration (Job Sheets #1-#3)

(NOTE: Infiltration must be detected early.)

A. When taping and dressing, never apply tape or dressing beyond 1/2 to 1 inch above insertion site

(NOTE: If the tape and dressing is applied 2 to 3 inches above insertion site, an infiltration gets a good head start before it can be observed.)

B. Use splints if necessary

C. Use restraints if necessary

INFORMATION SHEET

D. Check IV site frequently

(NOTE: Site should be checked at least every hour and always before administration of medications. Always check IV site visually every time you are in the patient's room.)

E. Feel site lightly

(NOTE: Always use a light touch so that you will not cause discomfort. The site can be felt every time you are working with the patient.)

F. Compare size of insertion arm to opposite arm

(NOTE: If there is a noticeable size difference, check placement and patency.)

G. Check patency whenever there is the slightest doubt (Job Sheets #1 and #2)

H. Check IV site and/or patency before administering a medication

I. Check IV site and catheter patency *every* time before administering a medication by heparin lock (Job Sheet #3)

J. Have more-experienced nurse check IV site if you are in doubt

(CAUTION: Whenever patency cannot be confirmed and there is reasonable doubt, discontinue the IV, and restart it using the other arm if possible.)

K. Discontinue IV *immediately* if infiltration is confirmed

L. Obtain and know hospital policy and/or standing orders regarding infiltration

M. Apply ice packs for first twenty-four hours

(NOTE: Check to see if your hospital has a policy for the use of ice packs. Some hospitals may require a doctor's order.)

(CAUTION: The use of an ice pack must be on an intermittent basis, and the skin must be protected to prevent the possibility of tissue damage [frostbite].)

N. Elevate extremity for patient comfort

O. Enlist patient's and/or family's cooperation

(NOTE: Ask patient and/or family to call if they notice any burning, pain, or swelling at the site.)

INFORMATION SHEET

P. Apply warm, moist packs if infiltration is extensive

Q. Reassure patient and family

R. Document all of your assessments, observations, and actions on the appropriate chart form

IX. Thrombus formation

A. Is formation of a blood clot at needle or catheter tip or on wall of vein

B. Can occur if vein is injured during insertion or withdrawl of needle or catheter

C. Can occur if vein is injured by chemical or mechanical irritation

(NOTE: The irritation can be due to the type of solution infused, type of medication administered, any incompatabilities, and by long-term IV therapy.)

D. If fluid is infused too slowly, occurs due to inadequate amount of fluid passing through needle or catheter, or by blood collecting and then clotting around tip of needle or catheter

X. Sign of thrombus formation--Nonrunning or sluggishly running IV only outward sign

XI. Nursing responsibilities and interventions with regard to thrombus formation (Job Sheet #4)

(NOTE: The major nursing intervention is prevention.)

A. Avoid traumatizing vein during venipuncture

B. Avoid using veins in feet and legs

C. Infuse IV at a rate to keep a constant flow through needle or catheter

D. Use microdrip tubing on all keep-open IVs

E. Choose vein large enough to allow adequate blood flow around needle or catheter

F. Stabilize needle or catheter and tubing well

(NOTE: Movement of needle or catheter and/or tubing can injure the vein wall.)

G. Avoid manipulation of needle or catheter during dressing and/or tubing change

INFORMATION SHEET

H. Discontinue and restart IV if steps to correct sluggishly running or nonrunning IV are not effective

I. Use splints and/or restraints if necessary

J. Enlist patient's and/or family's cooperation

(NOTE: Tell patient or family to call if flow stops or if tape comes loose.)

K. Document all of your assessments, observations, and actions on the appropriate chart form

XII. Phlebitis

A. Is inflammation of wall of vein

(NOTE: Although the inflammation is usually sterile, the inflammation can occasionally be caused by an infection. Infection-caused phlebitis is very serious.)

B. Is one of the more common complications of IV therapy

C. Causes vein and connecting veins distal to vein to be useless for any further IV therapy for a long time

XIII. Signs of phlebitis

A. Painful redness at insertion site

(CAUTION: If allowed to continue, phlebitis can extend a variable distance along the vein.)

B. Increased warmth in area of vein and surrounding tissue

XIV. Factors contributing to phlebitis (Assignment Sheet #1)

A. Duration of infusion at a particular site

(NOTE: The incidence of phlebitis increases with the length of infusion at a site. The usual recommended procedure is to change the site every forty-eight to seventy-two hours unless absolutely impossible. Obtain and know your hospital's policy. The occurrance of phlebitis will be 100 percent if one site is used for a long enough period.)

B. Mechanical irritation

EXAMPLES: Movement of needle or catheter in vein; composition of material for catheter or needle (phlebitis occurs more quickly when a plastic catheter is used)

INFORMATION SHEET

C. Composition of solution infused

EXAMPLES: Hypertonic solution such as high percentage dextrose and amino acid solutions; acid or alkaline solutions such as D_5W with a pH of 4.0

D. Medications

(NOTE: Medications can cause a chemical irritation. The final dilution of the medication solution can influence the degree of irritation.)

E. Choice of insertion site

EXAMPLES: Insertion in elbow allowing catheter to bend; insertion in bend of wrist allowing catheter to telescope into and out of vein

F. Size of vein and needle chosen

(NOTE: Too large a needle or catheter can occlude the lumen of the vein with a resultant irritation of the vein wall. Also, the dilution of a solution or medication by blood influences irritation.)

G. Techniques of insertion

(NOTE: Any trauma to the wall of the vein during insertion increases the chance of phlebitis.)

XV. Nursing responsibilities and interventions with regard to phlebitis (Assignment Sheet #1)

(NOTE: Follow hospital policy or standing orders regarding treatment of phlebitis.)

A. Prevent occurrence by choosing vein carefully and avoiding veins in areas of joint flexion

(NOTE: Make sure that vein is large enough to accommodate needle or catheter and to provide for an adequate blood flow around needle or catheter.)

(CAUTION: Avoid using veins in feet or legs.)

B. Use proper technique for insertion

C. Secure needle or catheter well

D. Use spints and/or restraints if necessary

INFORMATION SHEET

E. Change IV site every forty-eight to seventy-two hours

(NOTE: Occasionally the patient will have poor veins or will have had prolonged IV therapy, and veins will be very difficult to find.)

(CAUTION: If IV needle or catheter is left in a site over seventy-two hours, it must be monitored extra carefully for signs of phlebitis.)

F. Discontinue IV at first sign of redness; restart in opposite side if possible

(NOTE: Use the other arm if possible. If the other arm is not available, then you must use a vein that does not connect closely with the phlebitic vein.)

G. Use proper technique for discontinuing IV

H. Apply warm, moist compresses and elevate extremity for patient comfort

I. Document all of your assessments, observations, and actions on appropriate chart form

XVI. Local and systemic allergic reactions

A. Local--Result from sensitivity of skin and/or vein to needle or catheter, prep agent, antimicrobial ointment, or tape

(NOTE: Local allergic reactions rarely occur with a wing-tipped needle.)

B. Systemic--Result from sensitivity to a solution, additive, or medication

XVII. Signs and symptoms of local and systemic reactions

A. Local

1. Sign--Reddened area around length of catheter or under dressing or tape

2. Symptom--Burning and itching at insertion area

B. Systemic

1. Signs

a. Generalized rash

b. Shortness of breath

c. Decreased blood pressure

d. Syncope

INFORMATION SHEET

2. Symptom--Generalized itching

   (NOTE: A systemic allergic reaction can result in the death of a patient.)

XVIII. Nursing responsibilities and interventions according to types of allergic reactions

A. Local

1. Obtain nursing history

   (NOTE: Check for previous allergy to plastic catheter, tape, or prep agent.)

2. Observe site for signs of allergic reaction

3. Discontinue IV; restart using wing-tipped needle

   (NOTE: This action is done if allergy is to plastic catheter.)

4. Use nonallergenic (paper) tape if necessary

5. Enlist patient's and/or family's cooperation

   (NOTE: Tell patient or family to call if burning or itching at site is noted.)

6. Document all of your assessments, observations, and actions on the appropriate chart form

B. Systemic

1. Obtain nursing history

   (NOTE: Check for previous allergy to an IV solution or medication.)

2. Monitor patient for signs and symptoms of allergic reaction

3. Enlist patient's and/or family's cooperation

   (NOTE: Instruct patient or family to call if generalized itching, rash, or shortness of breath is noted.)

4. Stop infusion of solution or medication immediately

5. Call for help of another nurse

6. Change type of solution, and tubing down to venous needle, if solution or additive is suspected source

   (CAUTION: Keep the vein open. It may be your patient's only lifeline.)

7. Change tubing down to venous needle if piggyback medication is suspected source

INFORMATION SHEET

8. Have another nurse stay with patient and monitor vital signs as indicated
9. Notify physician
10. Reassure patient and family
11. Prepare to give any ordered drugs or treatment promptly
12. Document all of your assessments, observations, and actions on the appropriate chart form

XIX. Pyrogenic reactions

A. Are due to a pyrogen being introduced into blood and causing an infection of the blood

EXAMPLES: Bacteria, fungus

(NOTE: The occurence of a pyrogenic reaction from IV therapy is rare today but can occur more frequently with blood and blood products if these are not refrigerated or infused properly.)

B. Can occur any time aseptic technique is broken or compromised

EXAMPLES: Touch contamination, any interruption into line

XX. Signs and symptoms of pyrogenic reactions

A. Signs

1. Sudden onset of chills and fever
2. Foul-smelling discharge at insertion site
3. Vomiting
4. Septic shock
5. Vascular collapse

B. Symptoms

1. General malaise
2. Headache
3. Nausea

XXI. Nursing responsibilities and interventions with regard to pyrogenic reactions (Job Sheet #5)

A. Prevent occurrence

1. Follow proper procedure when obtaining and checking solution and container before administering

INFORMATION SHEET

2. Wash hands frequently and well

3. Use proper aseptic technique whenever working with an IV

4. Change IV solution every twenty-four hours

   (NOTE: Obtain and know your hospital's policy for solution change.)

5. Change IV tubing and cleanse and inspect IV site every twenty-four hours

   (NOTE: Obtain and know your hospital's policy for daily care of site and equipment.)

6. Protect insertion site from accidental contamination

7. Change entire system if any part becomes contaminated

B. Monitor for signs and symptoms of sudden onset of infectious process

(NOTE: The onset of chills and fever can occur within thirty minutes of the introduction of bacteria.)

C. Follow proper nursing interventions if sudden onset of infectious process is noted (Job Sheet #5)

XXII. Types of emboli

A. Pulmonary embolus--Can occur when a substance becomes free-floating in blood and obstructs an arterial blood vessel in the lung

(NOTE: Substances that cause pulmonary emboli include blood clots and medication crystals.)

B. Air embolus--Can occur when a gas is allowed to enter the vein

(NOTE: This air can then replace the blood in the heart and cause severe problems. The occurrence of air emboli is rare with peripheral IV therapy, but can be caused by allowing a container to run dry, a loose connection, or incorrect setup or malfuction of infusion pump.)

C. Catheter embolus--Can occur when all or part of plastic catheter becomes free-floating in blood and obstructs an arterial blood vessel in the lung

(NOTE: The occurence of catheter emboli is rare with peripheral IV therapy, but can be caused by reinserting the stylet into the catheter after stylet has been partially or completely withdrawn.)

INFORMATION SHEET

XXIII. Signs of pulmonary, air, and catheter emboli

A. Pulmonary

1. Drop in blood pressure
2. Respiratory distress
3. Chest pain
4. Rapid respiratory rate
5. Cyanosis of upper chest
6. Syncope
7. Apnea

B. Air

1. Drop in blood pressure
2. Weak rapid pulse
3. Rise in venous pressure
4. Cyanosis
5. Syncope

C. Catheter

1. Absence or partial absence of plastic catheter after withdrawal
2. Drop in blood pressure
3. Rise in venous pressure
4. Weak rapid pulse
5. Cyanosis
6. Syncope

XXIV. Nursing responsibilities and interventions according to types of emboli (Job Sheets #6 and #7)

A. Pulmonary embolus

1. Prevent occurrence when possible

a. Use in-line filters

(NOTE: These remove particulate matter and/or undissolved crystals of medication.)

INFORMATION SHEET

- b. Check for incompatibilities
- c. Avoid using veins in feet and legs
- d. Use great care when flushing a sluggishly running or nonrunning IV

2. Monitor for respiratory distress

   (NOTE: The initial sign would probably be respiratory distress, so your initial nursing interventions would be directed to this aspect.)

3. Follow proper nursing interventions for sudden onset of respiratory distress or syncope (Job Sheet #6)

B. Air embolus

   1. Prevent occurrence
      - a. Fill IV system properly
      - b. Check IV frequently for possible disconnections
      - c. Tape all connections securely
      - d. Change IV container before fluid leaves drip chamber
      - e. Follow proper procedure when setting up administration set for infusion pump
      - f. Monitor infusion pump for possible malfunction
   2. Monitor for respiratory distress
   3. Follow proper nursing interventions for sudden onset of respiratory distress or syncope (Job Sheets #6 and #7)

C. Catheter embolus

   (NOTE: Suspect catheter embolus if after withdrawal any or all of catheter is missing.)

   1. Prevent occurrence
      - a. *Completely* remove stylet from plastic catheter; *never* reinsert stylet
      - b. Prevent bending of catheter
   2. Apply tourniquet on upper part of insertion extremity if embolus is suspected, and restart IV in opposite extremity

INFORMATION SHEET

3. Monitor for respiratory distress

4. Follow proper nursing interventions for sudden onset of respiratory distress or syncope (Job Sheets #6 and #7)

XXV. Pulmonary edema (Assignment Sheet #1)

A. Causes

1. Too much fluid infused to rapidly

EXAMPLES: Amount ordered by physician too much for patient's cardiovascular system to circulate adequately; accidental rapid infusion

(NOTE: Even the young, healthy patient can go into pulmonary edema if too much fluid is given too quickly.)

2. Infusion of wrong type IV solution

EXAMPLE: Solution with high sodium chloride content

3. Preexisting cardiac and/or renal disease

B. Results

1. Dilation of ventricles and inability of ventricles to empty completely

2. Blood backing up in ventricles and pulmonary vessels

3. Fluid collecting in lungs and reducing gas exchange

4. Respiratory distress

5. Increased venous pressure

XXVI. Signs of pulmonary edema (Assignment Sheet #1)

A. Respiratory rate increase without obvious cause

(NOTE: This is frequently the first sign.)

EXAMPLE: From sixteen at 8 A.M. to twenty-eight at 10 A.M. and patient has been asleep

B. Dry, hacky cough

INFORMATION SHEET

C. Respiratory distress

D. Pulse rate increase without obvious cause

E. Rales

F. Ronchi

G. Neck vein distention

H. Cough producing a pink frothy sputum

I. Ventricular gallop

XXVII. Nursing responsibilities and interventions with regard to pulmonary edema (Assignment Sheet #1; Job Sheet #8)

A. Obtain nursing history

(NOTE: Check for any existing cardiac or renal problems which could predispose the patient to pulmonary edema.)

B. Monitor intake and output of any patient on IV therapy

(NOTE: A doctor's order is not necessary to monitor intake and output.)

C. Assess eight-hour and twenty-four-hour intake and output totals

D. Report a consistent excess of intake to physician

E. Monitor daily weight if patient has predisposing factors

(NOTE: A doctor's order is not necessary for a daily weight. If the patient is on bed rest, a bed scale can be used. Weight is one of the best indicators of fluid balance.)

F. Monitor infusion rate frequently

G. Enlist patient's and/or family's cooperation

(NOTE: Tell patient and family not to adjust flow control clamp and to call if flow rate increases or decreases noticeably.)

H. Check to see if position of arm affects flow rate

(NOTE: Position of arm could cause IV rate to decrease or increase with any movement.)

I. Adjust flow rate with extremity in optimal position if positional

J. Use splints and/or restraints if necessary

K. Monitor vital signs at least once per shift

INFORMATION SHEET

L. Auscultate chest at least once per shift

M. Monitor for respiratory distress

N. Follow proper nursing interventions for respiratory distress that may have been caused by fluid overload (Job Sheet #8)

XXVIII. Speed shock--Is systemic reaction caused by too rapid introduction of a foreign substance (i.e. drug) into circulation; the concentration of the foreign substance in plasma reaches toxic proportions and floods the organs rich in blood

XXIX. Signs and symptoms of speed shock

(NOTE: Speed shock can result in death of patient.)

A. Signs

1. Flushed face
2. Irregular pulse
3. Shock
4. Syncope
5. Cardiac arrest

B. Symptoms

1. Headache
2. Tightness in chest

XXX. Nursing responsibilities and interventions with regard to speed shock

(CAUTION: This complication should never happen.)

A. *Always* check on method or mode and length of injection or infusion before administering an IV drug

EXAMPLES: Direct injection, intermittent infusion

B. Consider use of microdrip tubing for piggyback administration of drugs

C. Check to see if position of arm affects flow before setting flow rate of piggyback administration

D. Enlist patient's and/or family's cooperation

(NOTE: Tell patient and family never to adjust flow control clamp on main IV solution tubing or piggyback tubing, and to call if the flow rate increases or decreases.)

PROBLEMS AND COMPLICATIONS
UNIT IX

ASSIGNMENT SHEET #1--EVALUATE SPECIFIC SITUATIONS FOR PROBLEMS OR COMPLICATIONS OF IV THERAPY

NAME ______________________ SCORE ____________

This assignment sheet is designed to assist you in the recognition and/or prevention of complications of IV therapy.

PART I

Read the case study below, and answer the questions that follow.

B. Kool, age forty-nine, was admitted for acute pancreatitis four days ago. He has had IV therapy since admission. When you check the IV, you discover a red streak extending approximately 4 inches up the vein at the insertion site. The site is painful and slightly swollen.

A. What is the problem? ______________________

B. How could you have prevented this problem? ______________________

C. What actions would you take after discovering the problem? ______________________

ASSIGNMENT SHEET #1

PART II

Read the case study below, and answer the questions that follow.

Mrs. U. R. Quiet, age sixty-nine, was admitted five days ago for nausea and vomiting. She has been on digitalis for four years and had a heart attack five years ago. An IV was begun, and D_5NS was the prescribed fluid ordered at a rate of 125 ml an hour. When you check her at 4 P.M., you find that her pulse is 120, her respirations are 28, and she has a dry hacky cough. She has been quietly sitting in the chair watching television.

A. What is the problem?

B. How could this problem have been prevented?

PROBLEMS AND COMPLICATIONS
UNIT IX

ANSWERS TO ASSIGNMENT SHEET

PART I

Answer should include the following

A. Phlebitis

B. The IV site should have been changed within forty-eight to seventy-two hours

C.
  1. Discontinue IV
  2. Restart IV, using other arm
  3. Apply warm moist pack to affected arm
  4. Elevate extremity
  5. Document all of your assessments, observations, and actions on appropriate chart form

PART II

Answer should include the following

A. Respiratory distress; probable cause fluid overload

B.
  1. A careful nursing history would have shown a predisposition to problems such as fluid overload
  2. The intake and output could have been monitored more closely to assess overall excess of intake
  3. A daily weight could have been done
  4. The doctor could have been reminded of the infusion rate and high normal saline content of the solution

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #1--CONFIRM PLACEMENT AND PATENCY OF OVER-THE-NEEDLE CATHETER

I. Equipment--Tourniquet

II. Procedure

A. Obtain equipment and take to room

B. Identify yourself to patient and/or family

C. Identify patient using appropriate communication tool

D. Wash hands

E. Explain procedure to patient

F. Find tip of catheter

(NOTE: You can estimate where the tip is by knowing the length of catheter, such as 1 1/4 inches, and estimating this length up from catheter hub.)

G. Apply tourniquet about 3 inches above tip of catheter

(NOTE: Apply tourniquet tightly enough to restrict venous flow.)

H. Observe for flow of IV fluid

1. Stoppage of IV flow means that ONC is adequately placed and patent

2. Continued flow means IV has infiltrated

(NOTE: This procedure will not promote or produce infiltration and can be used as often as necessary.)

I. Wash hands before leaving room

J. Document all of your assessments, observations, and actions on appropriate chart form

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #2--CONFIRM PLACEMENT AND PATENCY OF WING-TIPPED NEEDLE

I. Equipment--None required

II. Procedure

A. Identify yourself to patient and/or family

B. Identify patient using appropriate communication tool

C. Wash hands

D. Explain procedure to patient

E. Remove IV container from pole

F. Lower container approximately 12 inches below level of insertion site

G. Observe needle tubing for backflow of blood

(NOTE: This backflow should occur within three to five seconds.)

H. Pinch IV tubing with fingers just above distal tip

(NOTE: This causes a slight vacuum effect and can act as gentle aspiration to encourage a backflow of blood.)

I. Discontinue IV if above-listed steps fail to produce backflow of blood

J. Wash hands before leaving room

K. Document all of your assessments, observations, and actions on appropriate chart form

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #3--CONFIRM PLACEMENT AND PATENCY OF WING-TIPPED HEPARIN LOCK

I. Equipment

- A. Three-milliliter syringe with 23- or 25-gauge needle
- B. Sterile normal saline for injection
- C. Tourniquet
- D. Two alcohol prep sponges

II. Procedure

(NOTE: Steps A through D are done before going to patient's bedside.)

- A. Obtain equipment and take to room
- B. Wash hands
- C. Cleanse rubber injection cap of sterile normal saline with alcohol sponge
- D. Draw up two milliliters of normal saline into syringe
- E. Take equipment to bedside
- F. Identify yourself to patient and/or family
- G. Identify patient using appropriate communication tool
- H. Wash hands
- I. Explain procedure to patient
- J. Cleanse injection port of heparin lock with alcohol sponge
- K. Pierce injection cap with syringe filled with normal saline
- L. Draw back gently with syringe
- M. Observe heparin lock tubing for backflow of blood
- N. Flush backflow of blood through heparin lock with normal saline
- O. Apply tourniquet approximately 3 to 4 inches above heparin lock

  (NOTE: This step is necessary *only* if steps L and M did not produce backflow of blood.)
- P. Draw back gently with syringe

JOB SHEET #3

Q. Observe heparin lock tubing for backflow of blood

R. Release tourniquet

S. Flush backflow of blood through heparin lock with normal saline

T. Remove tape securing heparin lock

(NOTE: This step is necessary *only* if steps L and M and/or O and P did not produce backflow of blood.)

(CAUTION: Be very careful when removing the tape, or you may cause the needle to pierce the vein wall.)

U. Lift up slightly on heparin lock wings

V. Draw back gently with syringe

W. Observe heparin lock tubing for backflow of blood

X. Return backflow of blood at this point indicates bevel of heparin lock was against wall of vein

Y. Place alcohol sponge under wings

Z. Flush backflow of blood through heparin lock with normal saline

AA. Perform taping and dressing procedure

BB. Discontinue heparin lock if the steps listed above fail to produce a backflow of blood

CC. Wash hands before leaving room

DD. Document all of your assessments, observations, and actions on appropriate chart form

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #4--REESTABLISH PRESCRIBED FLOW RATE

I. Equipment

A. Tape

B. Gauze 2x2s

II. Procedure

(CAUTION: Never irrigate a nonrunning or sluggishly running noninfiltrated IV with syringe and sterile normal saline. This procedure could force a clot loose and render it free-floating in the venous system.)

A. Obtain equipment and take to room

B. Identify yourself to patient and/or family

C. Identify patient using appropriate communication tool

D. Wash hands

E. Explain procedure to patient

F. Check for kinks in tubing

(NOTE: The patient may have turned over on the tubing and kinked the tubing.)

G. Make sure that proper tubing has been used

EXAMPLE: Vented tubing in nonvented glass bottle

H. Pull back slightly on needle or catheter

(NOTE: If solution then runs well, the needle or catheter was against the vein wall or a bifurcation.)

1. Remove tape if step H produced adequate flow rate

2. Pull back slightly on untaped needle or catheter until adequate flow rate is observed

3. Perform taping and dressing procedure

(CAUTION: Never reintroduce into the vein any portion of the needle or catheter that has been withdrawn during this procedure.)

JOB SHEET #4

I. Irrigate tubing by hand

   1. Pinch tubing off with fingers about 12 to 16 inches above insertion site

   2. Pump flashback apparatus several times

      EXAMPLE: Travenol tubing

      (NOTE: Not all tubings have a flashback apparatus.)

   3. Strip tubing downward toward insertion site with thumb and first finger

J. Slightly elevate wings of wing-tipped needle

   1. Remove tape if step J produced adequate flow rate

   2. Place folded gauze 2x2 under wings

   3. Perform taping and dressing procedure

K. Wash hands before leaving room

L. Document all of your assessments, observations, and actions on appropriate chart form

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #5--PERFORM PROPER NURSING INTERVENTIONS FOR SUDDEN ONSET OF INFECTIOUS PROCESS THAT MAY HAVE BEEN CAUSED BY IV SYSTEM

I. Equipment

- A. Sterile needle
- B. Sterile scissors
- C. Sterile container or culture tube

  (NOTE: Container is needed to send tip of catheter to lab.)

- D. Betadine or provodine iodine prep sponges
- E. Gauze 2x2s
- F. Tape

II. Procedure

- A. Obtain equipment and take to room
- B. Identify yourself to patient and/or family
- C. Identify patient using appropriate communication tool
- D. Wash hands
- E. Discontinue IV immediately
- F. Clip off tip of catheter into sterile container or culture tube and send to lab for culture

  (CAUTION: Use sterile scissors when clipping catheter.)

- G. Cap distal tip of IV tubing with sterile needle and send container and tubing to lab for culture
- H. Obtain culture of IV site if discharge is noted at site
- I. Cleanse IV site carefully with Betadine ointment
- J. Cover IV site with dry, sterile gauze 2x2s
- K. Wash hands
- L. Obtain vital signs

JOB SHEET #5

M. Explain previous procedures to patient and family

N. Wash hands

O. Restart IV using other arm if at all possible

P. Obtain vital signs

Q. Have another nurse stay with patient if patient's condition is unstable

R. Notify physician

S. Monitor vital signs as indicated by patient's condition

T. Continue to reassure patient and family

U. Wash hands before leaving room

V. Document all of your assessments, observations, and actions on the appropriate chart form

(NOTE: Check to see if your hospital has a policy and procedure for suspected pyrogenic reactions.)

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #6--PERFORM PROPER NURSING INTERVENTIONS FOR SUDDEN ONSET OF RESPIRATORY DISTRESS THAT MAY HAVE BEEN CAUSED BY IV SYSTEM

I. Equipment

  A. Two to four pillows

  B. Oxygen equipment

    1. Cannula or mask

    2. Sterile water for humidification

    3. Wall regulator

II. Procedure

  (NOTE: The first sign you will probably see of pulmonary or catheter emboli will be either respiratory distress or syncope. Your nursing interventions must be directed to the greatest immediate need.)

  A. Obtain equipment and take to room

  B. Monitor patient for increase in respiratory rate or labored breathing

  C. Elevate head of bed

  D. Support arms on pillows or overbed table

  E. Obtain vital signs

  F. Start oxygen

  (NOTE: Obtain and know your hospital's policy for the use of oxygen. Some hospitals require a doctor's order before oxygen is started.)

  G. Call for another nurse to stay with patient to monitor vital signs

  H. Reassure patient and family

  I. Check IV system for possible disconnections

  J. Wash hands before leaving room

  (NOTE: Wash hands each time before leaving room.)

  K. Notify physician

  L. Maintain patent airway

JOB SHEET #6

M. Prepare to administer drugs

N. Monitor vital signs as indicated by patient's condition

O. Document all of your assessments, observations, and actions on the appropriate chart form

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #7--PERFORM PROPER NURSING INTERVENTIONS FOR SYNCOPE THAT MAY HAVE BEEN CAUSED BY IV SYSTEM

I. Equipment

A. Two to four pillows

B. Oxygen equipment

1. Cannula or mask
2. Sterile water for humidification
3. Wall regulator

II. Procedure

(NOTE: The first sign you will probably see for air emboli will probably be syncope. Your nursing interventions must be directed to the greatest immediate need.)

A. Obtain equipment and take to room

B. Obtain vital signs

C. Call for another nurse

D. Check IV system for possible disconnections; suspect air embolism if disconnection is found

E. Return patient to bed if necessary

F. Turn patient on left side and support with pillows

G. Lower head of bed to modified Trendelenberg

(NOTE: This causes the air to rise in the right atrium where it is released in small amounts into the blood and then into the lungs where it is absorbed.)

H. Maintain patent airway

I. Start oxygen

(NOTE: Obtain and know your hospital's policy for the use of oxygen. Some hospitals require a doctor's order before oxygen is started.)

J. Wash hands before leaving room

(NOTE: Wash hands each time before leaving room.)

K. Notify physician

JOB SHEET #7

L. Monitor vital signs as indicated by patient's condition

M. Reassure patient and family

N. Document all your assessments, observations, and actions on appropriate chart form

PROBLEMS AND COMPLICATIONS
UNIT IX

JOB SHEET #8--PERFORM PROPER NURSING INTERVENTIONS FOR RESPIRATORY DISTRESS THAT MAY HAVE BEEN CAUSED BY FLUID OVERLOAD

I. Equipment

A. Two to four pillows

B. Oxygen equipment

1. Cannula or mask

2. Sterile water for humidification

3. Wall regulator

II. Procedure

A. Obtain equipment and take to room

B. Slow IV to KVO rate

C. Elevate head of bed; support patient's arms on pillows or overbed table

D. Administer IV morphine if ordered

(NOTE: Morphine is a very important part of the treatment of pulmonary edema. It produces a sense of well-being, slows respirations, and produces a mild vasodilation with slight reduction of circulating volume.)

E. Start oxygen

(NOTE: Obtain and know your hospital's policy for the use of oxygen. Some hospitals require a doctor's order before oxygen is started.)

F. Obtain vital signs

G. Auscultate lungs and heart

(NOTE: You are listening for sounds that were not in chest before, such as rales, ronchi, or a ventricular gallop.)

H. Observe neck veins for distention

(NOTE: To check for neck vein distention, the head of bed must be up at least 45 degrees. It is also difficult to ascertain neck vein distention in the grossly overweight.)

I. Call another nurse to stay with patient

J. Reassure patient and family

K. Wash hands before leaving room

(NOTE: Wash hands each time before leaving room.)

JOB SHEET #8

L. Notify physician

M. Prepare to notify respiratory therapy of need for positive pressure treatments

N. Prepare to administer many IV drugs

EXAMPLES: Digitalis, Lasix, morphine

O. Monitor IV infusion closely and keep at a slow rate

P. Monitor vital signs as indicated by patient's condition

Q. Monitor urine output

R. Restrict oral fluids

S. Document all of your assessments, observations, and actions on the appropriate chart form

PROBLEMS AND COMPLICATIONS
UNIT IX

TEST

NAME ______________________________ SCORE ______________

1. Match to their correct definitions terms associated with IV problems and complications. Write the correct numbers in the blanks.

_____a. Bluish skin color caused by lack of oxygen in the blood

_____b. Free from disease-producing microorganisms

_____c. Sound resembling gallop of a horse; heard when listening to the heart

_____d. Mixture of several parts or ingredients; the makeup of an object or person

_____e. To reduce in size; draw together

_____f. Listen to

_____g. Poisonous

_____h. Fainting caused by inadequate blood flow to brain

_____i. State of being freely open; unobstructed

_____j. Full of twists and turns; winding; crooked

_____k. Death of tissue

_____l. To subject to injury

_____m. To make susceptible; to make receptive beforehand

_____n. Foreign protein such as bacteria or fungus

_____o. Bubbling sound heard when listening to lungs

_____p. Wheezing sound heard when listening to lungs

_____q. Reaction to a substance; may be local or systemic

_____r. Foreign matter carried in the blood

_____s. Affecting the body as a whole

1. Systemic
2. Ventricular gallop
3. Auscultate
4. Necrosis
5. Predispose
6. Patency
7. Toxic
8. Traumatize
9. Syncope
10. Tortuous
11. Ronchi
12. Composition
13. Sensitivity
14. Pyrogen
15. Aseptic
16. Embolus
17. Cyanosis
18. Contract
19. Rale

TEST

2. Distinguish between general classifications of IV problems and complications. Write an "L" before local complications and an "S" before systemic complications. A blank may contain more than one answer.

_____a. Air embolus

_____b. Phlebitis

_____c. Pyrogenic reactions

_____d. Hematoma

_____e. Speed shock

_____f. Pulmonary embolus

_____g. Catheter embolus

_____h. Infiltration

_____i. Pulmonary edema

_____j. Thrombus formation

_____k. Allergic reactions

3. Discuss hematoma as related to IV therapy.

4. Select from the following list nursing responsibilities and interventions with regard to hematomas. Write an "X" in the blank before each correct answer.

_____a. Use cool, dry compress after first twelve hours

_____b. Encourage vigorous exercise

_____c. Use heating pad over large and/or painful areas

_____d. Document all of your assessments, observations, and actions on the appropriate chart form

_____e. Use pressure over insertion site immediately after withdrawal of catheter or needle

5. Discuss infiltration.

TEST

____

____

____

____

____

6. List signs of infiltration.

a. ____

b. ____

c. ____

d. ____

e. ____

7. State reasons for preventing infiltration.

a. ____

b. ____

c. ____

d. ____

e. ____

8. Select from the following list nursing responsibilities and interventions with regard to infiltration. Write an "X" in the blank before each correct answer. Responsibilities and interventions are continued on the next page.

_____a. Feel site lightly

_____b. Discontinue IV *immediately* if infiltration is confirmed

_____c. Check IV site whenever you have time

_____d. Use splints if necessary

_____e. Check patency whenever there is the slightest doubt

_____f. Apply warm, moist packs if infiltration is extensive

_____g. Have more-experienced nurse check IV site if you are in doubt

_____h. Use tourniquet technique to check patency at least four times in eight hours

TEST

_____i. When taping and dressing, never apply tape or dressing beyond 1/2 to 1 inch above insertion site

_____j. Reassure patient and family

_____k. Apply ice packs for first forty-eight hours

_____l. Use restraints if necessary

_____m. Obtain and know hospital policy and/or standing orders regarding infiltration

_____n. Check IV site once per shift

_____o. Lower extremity for patient comfort

_____p. Document all of your assessments, observations, and actions on the appropriate chart form

_____q. Apply ice packs for first twenty-four hours

_____r. Lower container to check patency before giving medication

_____s. Apply dressing and tape at least 2 to 3 inches above insertion site to protect site

_____t. Check IV site frequently

_____u. Elevate extremity for patient comfort

_____v. Check IV site and catheter patency *every* time before administering a medication by heparin lock

_____w. Compare size of insertion arm to opposite arm

_____x. Check IV site and/or patency before administering a medication

_____y. Enlist patient's and/or family's cooperation

9. Discuss thrombus formation.

____

____

____

____

____

____

10. State the sign of thrombus formation.

____

TEST

11. Select from the following list nursing responsibilities and interventions with regard to thrombus formation. Write an "X" in the blank before each correct answer.

_____a. Stabilize needle or catheter and tubing well

_____b. Use macrodrip tubing on all keep-open IVs

_____c. Use splints and/or restraints if necessary

_____d. Use good insertion technique if you have time

_____e. Avoid using veins in arms

_____f. Avoid traumatizing vein during venipuncture

_____g. Choose vein large enough to allow adequate blood flow around needle or catheter

_____h. Enlist patient's and/or family's cooperation

_____i. Irrigate IV with syringe and normal saline whenever flow is sluggish

_____j. Infuse IV very slowly if KVO is ordered

_____k. Avoid using veins in feet and legs

_____l. Document all of your assessments, observations, and actions on the appropriate chart form

_____m. Infuse IV at a rate to keep a constant flow through needle or catheter

_____n. Apply pressure over vein during withdrawal

_____o. Discontinue and restart IV if steps to correct sluggishly running or nonrunning IV are not effective

_____p. Avoid manipulation of needle or catheter during dressing and/or tubing change

12. Discuss phlebitis.

____

____

____

____

TEST

13. List signs of phlebitis.

a. ______________________________

b. ______________________________

14. List the factors contributing to phlebitis.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

15. Select from the following list nursing responsibilities and interventions with regard to phlebitis. Write an "X" in the blank before each correct answer.

_____a. Do not use splints and/or restraints

_____b. Use proper technique for discontinuing IV

_____c. Change IV site every twenty-four to forty-eight hours

_____d. Prevent occurrence by choosing vein carefully and avoiding veins in areas of joint flexion

_____e. Wait for all signs of phlebitis before changing IV site

_____f. Document all of your assessments, observations, and actions on appropriate chart form

_____g. Change IV site every forty-eight to seventy-two hours

_____h. Choose wrist vein because of its size

_____i. Apply ice packs for patient comfort

_____j. Discontinue IV at first sign of redness; restart in side opposite if possible

_____k. Use proper technique for insertion

_____l. Apply warm, moist compresses and elevate extremity for patient comfort

_____m. Use splints and/or restraints if necessary

_____n. Secure needle or catheter well

TEST

16. Distinguish between local and systemic allergic reactions. Write the correct numbers in the blanks.

_____ a. Result from sensitivity to a solution, additive, or medication

_____ b. Result from sensitivity of skin and/or vein to needle or catheter, prep agent, antimicrobial ointment, or tape

1. Local
2. Systemic

17. List signs and symptoms of local and systemic reactions.

a. Local

1) Sign--____

2) Symptom--____

b. Systemic

1) Signs

a) ____

b) ____

c) ____

d) ____

2) Symptom--____

18. Match types of allergic reactions to correct nursing responsibilities and interventions. Write the correct numbers in the blanks. Numbers may be used more than once. Some blanks may contain more than one answer. Responsibilities and interventions are continued on the next page.

_____ a. Have another nurse stay with patient and monitor vital signs as indicated

_____ b. Use nonallergenic (paper) tape if necessary

_____ c. Obtain nursing history

_____ d. Change tubing down to venous needle if piggyback medication is suspected source

_____ e. Document all of your assessments, observations, and actions on the appropriate chart form

_____ f. Monitor patient for signs and symptoms of allergic reaction

1. Local
2. Systemic

TEST

______g. Prepare to give any ordered drugs or treatment promptly

______h. Enlist patient's and/or family's cooperation

______i. Discontinue IV; restart using wing-tipped needle

______j. Notify physician

______k. Stop infusion of solution or medication immediately

______l. Reassure patient and family

______m. Call for help of another nurse

______n. Observe site for signs of allergic reaction

______o. Change type of solution, and tubing down to venous needle, if solution or additive is suspected source

19. Discuss pyrogenic reactions.

____

____

____

____

20. List signs and symptoms of pyrogenic reactions.

a. Signs

1) ________________________________

2) ________________________________

3) ________________________________

4) ________________________________

5) ________________________________

b. Symptoms

1) ________________________________

2) ________________________________

3) ________________________________

TEST

21. Select from the following list nursing responsibilities and interventions with regard to pyrogenic reactions. Write an "X" in the blank before each correct answer.

_____a. Wash hands frequently and well

_____b. Change IV solution every two hours

_____c. Protect insertion site from accidental contamination

_____d. Change contaminated part of IV setup if part becomes contaminated

_____e. Change IV tubing and cleanse and inspect IV site every two hours

_____f. Use proper aseptic technique whenever working with an IV

_____g. Follow proper procedure when obtaining and checking solution and container before administering

_____h. Monitor for signs and symptoms of sudden onset of infectious process

_____i. Follow proper nursing interventions if sudden onset of infectious process is noted

_____j. Prevent occurence

22. Discuss types of emboli.

Pulmonary embolus--______________________________

____

Air embolus--______________________________

____

Catheter embolus--______________________________

____

____

23. List signs of pulmonary, air, and catheter emboli.

a. Pulmonary

1) ______________________________

2) ______________________________

3) ______________________________

4) ______________________________

TEST

5) ____________________

6) ____________________

7) ____________________

b. Air

1) ____________________

2) ____________________

3) ____________________

4) ____________________

5) ____________________

c. Catheter

1) ____________________

2) ____________________

3) ____________________

4) ____________________

5) ____________________

6) ____________________

24. Match types of emboli to correct nursing responsibilities and interventions. Write the correct numbers in the blanks. Numbers may be used more than once. Some blanks may contain more than one answer. Responsibilities and interventions are continued on the next page.

_____a. Check IV frequently for possible disconnections

_____b. Monitor for respiratory distress

_____c. Prevent occurrence

_____d. Check for incompatibilities

_____e. Follow proper nursing interventions for sudden onset of respiratory distress or syncope

1. Pulmonary embolus
2. Air embolus
3. Catheter embolus

TEST

_____f. Prevent bending of catheter

_____g. Tape all connections securely

_____h. Use great care when flushing a sluggishly running or nonrunning IV

_____i. Prevent occurrence when possible

_____j. Change IV container before fluid leaves drip chamber

_____k. Fill IV system properly

_____l. Monitor infusion pump for possible malfunction

_____m. Use in-line filters

_____n. Apply tourniquet on upper part of insertion extremity if embolus is suspected, and restart IV in opposite extremity

_____o. Follow proper procedure when setting up administration set for infusion pump

_____p. Avoid using veins in feet and legs

_____q. *Completely* remove stylet from plastic catheter; *never* reinsert stylet

25. Discuss pulmonary edema.

Causes--____

____

____

____

Results--____

____

____

____

____

TEST

26. List signs of pulmonary edema.

a. ______

b. ______

c. ______

d. ______

e. ______

f. ______

g. ______

h. ______

i. ______

27. Select from the following list nursing responsibilities and interventions with regard to pulmonary edema. Write an "X" in the blank before each correct answer. Responsibilities and interventions are continued on the next page.

_____a. Monitor infusion rate frequently

_____b. Adjust flow rate with extremity in optimal position if positional

_____c. Monitor intake and output only if ordered

_____d. Monitor vital signs if ordered

_____e. Obtain nursing history

_____f. Follow proper nursing interventions for respiratory distress that may have been caused by fluid overload

_____g. Instruct patient to help by adjusting flow control clamp whenever flow rate decreases

_____h. Obtain daily weight only if ordered

_____i. Monitor for respiratory distress

_____j. Monitor vital signs at least once per shift

_____k. Monitor intake and output of any patient on IV therapy

_____l. Auscultate chest each A.M.

_____m. Assess eight-hour and twenty-four-hour intake and output totals

TEST

_____n. Monitor daily weight if patient has predisposing factors

_____o. Report any excess of intake

_____p. Use splints and/or restraints if necessary

_____q. Monitor skin turgor; give more fluid if turgor is poor

_____r. Check to see if position of arm affects flow rate

_____s. Enlist patient's and/or family's cooperation

_____t. Report a consistent excess of intake to physician

_____u. Do not use restraints

_____v. Rely on physician's history and physical to determine existing health problems

_____w. Auscultate chest at least once per shift

28. Discuss speed shock.

____

____

____

____

29. List signs and symptoms of speed shock.

a. Signs

1) ____

2) ____

3) ____

4) ____

5) ____

b. Symptoms

1) ____

2) ____

TEST

30. Select from the following list nursing responsibilities and interventions with regard to speed shock. Write an "X" in the blank before each correct answer.

______a. Enlist patient's and/or family's cooperation

______b. *Always* check the method or mode and length of injection or infusion after administering an IV drug

______c. Use macrodrip tubing

______d. Make sure that position of arm sets up resistance for flow rate

(NOTE: Test questions 31 and 32 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

31. Evaluate specific situations for problems or complications of IV therapy.

32. Demonstrate the ability to

    a. Confirm placement and patency of over-the-needle catheter.

    b. Confirm placement and patency of wing-tipped needle.

    c. Confirm placement and patency of wing-tipped heparin lock.

    d. Reestablish prescribed flow rate.

    e. Perform proper nursing interventions for sudden onset of infectious process that may have been caused by IV system.

    f. Perform proper nursing interventions for sudden onset of respiratory distress that may have been caused by IV system.

    g. Perform proper nursing interventions for syncope that may have been caused by IV system.

    h. Perform proper nursing interventions for respiratory distress that may have been caused by fluid overload.

PROBLEMS AND COMPLICATIONS
UNIT IX

ANSWERS TO TEST

1. a. 17
   b. 15
   c. 2
   d. 12
   e. 18
   f. 3
   g. 7
   h. 9
   i. 6
   j. 10
   k. 4
   l. 8
   m. 5
   n. 14
   o. 19
   p. 11
   q. 13
   r. 16
   s. 1

2. a. S
   b. L
   c. S
   d. L
   e. S
   f. S
   g. S
   h. L
   i. S
   j. L
   k. L, S

3. Discussion should include the following
   a. Is fairly common
   b. Can vary in size
   c. Can vary in degree of pain
   d. Is caused by bleeding from vein into surrounding tissue
   e. Will leave a bruise
   f. Usually occurs when needle or catheter is removed

ANSWERS TO TEST

4. d, e

5. Discussion should include the following
   - a. Is one of the most common complications of IV therapy
   - b. Is an infusion of IV solution and/or medication into surrounding tissue
   - c. Is caused by dislodgement of IV needle or catheter outside lumen of vein
     - 1) Partial–Occurs when only a portion of needle or catheter tip lies outside lumen of vein
     - 2) Complete--Occurs when bevel or tip of needle or catheter lies completely outside lumen of vein
   - d. Can be extensive if skin is loosely attached to underlying tissue
   - e. Can be extensive if infusion pump is used

6. a. Edema at or near insertion site
   - b. Coolness at and around insertion site
   - c. Sluggish flow with no obvious reason
   - d. Burning and/or pain at insertion site
   - e. Leaking of fluid at site

7. a. Can cause actual tissue damage and necrosis
   - b. Can prevent use of infiltrated extremity for further IV therapy for many days
   - c. Is very painful if extensive
   - d. Predisposes infiltrated extremity to infection
   - e. Prevents infusion of prescribed volume of solution

8. a, b, d, e, f, g, i, j, l, m, p, q, t, u, v, w, x, y

9. Discussion should include the following
   - a. Is formation of a blood clot at needle or catheter tip or on wall of vein
   - b. Can occur if vein is injured during insertion or withdrawl of needle or catheter

ANSWERS TO TEST

c. Can occur if vein is injured by chemical or mechanical irritation

d. If fluid is infused too slowly, occurs due to inadequate amount of fluid passing through needle or catheter, or by blood collecting and then clotting around tip of needle or catheter

10. Nonrunning or sluggishly running IV only outward sign

11. a, c, f, g, h, k, l, m, o, p

12. Discussion should include the following

    a. Is inflammation of wall of vein

    b. Is one of the more common complications of IV therapy

    c. Causes vein and connecting veins distal to vein to be useless for further IV therapy for a long time

13. a. Painful redness at insertion site

    b. Increased warmth in area of vein and surrounding tissue

14. a. Duration of infusion at a particular site

    b. Mechanical irritation

    c. Composition of solution infused

    d. Medications

    e. Choice of insertion site

    f. Size of vein and needle chosen

    g. Techniques of insertion

15. b, d, f, g, j, k, l, m, n

16. a. 2

    b. 1

ANSWERS TO TEST

17. Local

    1) Sign--Reddened area around length of catheter or under dressing or tape

    2) Symptom--Burning and itching at insertion area

    Systemic

    1) Signs

        a) Generalized rash

        b) Shortness of breath

        c) Decreased blood pressure

        d) Syncope

    2) Symptom--Generalized itching

18. a. 2
    b. 1
    c. 1, 2
    d. 2
    e. 1, 2
    f. 2
    g. 2
    h. 1, 2
    i. 1
    j. 2
    k. 2
    l. 2
    m. 2
    n. 1
    o. 2

19. Discussion should include the following

    a. Are due to a pyrogen being introduced into blood and causing an infection of the blood

    b. Can occur any time aseptic technique is broken or compromised

20. a. Signs

        1) Sudden onset of chills and fever

        2) Foul-smelling discharge at insertion site

ANSWERS TO TEST

        3) Vomiting
        4) Septic shock
        5) Vascular collapse
    b. Symptoms
        1) General malaise
        2) Headache
        3) Nausea

21. a, c, f, g, h, i, j

22. Discussion should include the following

    a. Pulmonary embolus--Can occur when substance becomes free-floating in blood and obstructs an arterial blood vessel in the lung

    b. Air embolus--Can occur when a gas is allowed to enter the vein

    c. Catheter embolus--Can occur when all or part of plastic catheter becomes free-floating in blood and obstructs an arterial blood vessel in the lung

23. a. Pulmonary
        1) Drop in blood pressure
        2) Respiratory distress
        3) Chest pain
        4) Rapid respiratory rate
        5) Cyanosis of upper chest
        6) Syncope
        7) Apnea
    b. Air
        1) Drop in blood pressure
        2) Weak rapid pulse

  - 3) Rise in venous pressure
  - 4) Cyanosis
  - 5) Syncope
- c. Catheter
  - 1) Absence or partial absence of plastic catheter after withdrawal
  - 2) Drop in blood pressure
  - 3) Rise in venous pressure
  - 4) Weak rapid pulse
  - 5) Cyanosis
  - 6) Syncope

24. a. 2
  b. 1, 2, 3
  c. 2, 3
  d. 1
  e. 1, 2, 3
  f. 3
  g. 2
  h. 1
  i. 1
  j. 2
  k. 2
  l. 2
  m. 1
  n. 3
  o. 2
  p. 1
  q. 3

25. Discussion should include the following
- a. Causes
  - 1) Too much fluid infused too rapidly
  - 2) Infusion of wrong type IV solution
  - 3) Preexisting cardiac and/or renal disease
- b. Results
  - 1) Dilation of ventricles and inability of ventricles to empty completely
  - 2) Blood backing up in ventricles and pulmonary vessels

ANSWERS TO TEST

3) Fluid collecting in lungs and reducing gas exchange

4) Respiratory distress

5) Increased venous pressure

26. a. Respiratory rate increase without obvious cause

    b. Dry, hacky cough

    c. Respiratory distress

    d. Pulse rate increase without obvious cause

    e. Rales

    f. Ronchi

    g. Neck vein distention

    h. Cough producing a pink frothy sputum

    i. Ventricular gallop

27. a, b, e, f, i, j, k, m, n, p, r, s, t, w

28. Discussion should include the following

    Is systemic reaction caused by too rapid introduction of a foreign substance (i.e. drug) into circulation; the concentration of the foreign substance in plasma reaches toxic proportions and floods the organs rich in blood

29. a. Signs

    1) Flushed face

    2) Irregular pulse

    3) Shock

    4) Syncope

    5) Cardiac arrest

    b. Symptoms

    1) Headache

    2) Tightness in chest

ANSWERS TO TEST

30. a

31. Evaluated to the satisfaction of the instructor

32. Performance skills evaluated to the satisfaction of the instructor

MONITORING AND MAINTENANCE OF THE IV
UNIT X

UNIT OBJECTIVE

After completing this unit, the student should be able to monitor and maintain an IV system and patient. This knowledge will be shown by completing the assignment sheet, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match to their correct definitions terms associated with monitoring and maintenance of the IV.
2. Match abbreviations associated with IV therapy to their correct terms.
3. State guidelines for maintaining prescribed flow rate.
4. Discuss factors that influence flow rate.
5. State instructions about IV therapy to be given to the patient.
6. Describe nursing interventions with regard to increasing patient mobility.
7. Discuss routine care of the IV system.
8. State nursing interventions with regard to monitoring IV system and patient.
9. Distinguish among chart forms and information required in documenting the monitoring and maintenance of IV therapy.
10. Document monitoring and maintenance of IV therapy.
11. Demonstrate the ability to
    a. Perform daily care for IV site and tubing.
    b. Replace IV tubing with ONC in place.
    c. Discontinue IV needle or catheter.
    d. Remove air from tubing by rolling tubing around pen or pencil.
    e. Remove air from tubing by manipulating air into drip chamber.
    f. Remove air from tubing by using a needle.

MONITORING AND MAINTENANCE OF THE IV
UNIT X

SUGGESTED ACTIVITIES

I. Suggested activities

   A. Order equipment planned to supplement unit.

      1. One artificial arm for every four to five students

         (CAUTION: When using the artificial arms, use only distilled water with the blood concentrate as the blood solution.)

      2. At least two IV containers for each student

         (NOTE: Only when using artificial arms, may some types of containers be reused.)

         (CAUTION: The IV containers must be emptied of IV solution and then rinsed and refilled with distilled water.)

      3. Two IV tubings for each student

      4. Two of each kind of IV needle and catheter for each student

         a. Wing-tipped

         b. Over-the-needle catheter

      5. At least four packages of gauze 2x2s for each student

         (NOTE: These gauze sponges are to be used with distilled water as the prep agent on the artificial arms.)

      6. At least one each of Betadine and alcohol sponges for each student

         (NOTE: These materials are not to be used on the artificial arms.)

      7. One tourniquet for every two students

      8. One roll each of 1/2-inch and 1-inch tape per student

      9. One IV pole for each artificial arm

      10. Distilled water

      11. Small, shallow, open container, two for each arm

          EXAMPLE: Emesis basins

          (NOTE: Containers are to be used as receptacles for the outlet tubing and for the distilled water to be used as the prep agent for the arms.)

SUGGESTED ACTIVITIES

12. Toweling or other absorbent material, at least two for each arm

    (NOTE: Toweling is to be used under artificial arms to absorb spills and as protection for table.)

13. One flat surface for each arm

    (NOTE: Surface should be of sufficient height for student comfort for performing venipuncture.)

B. Pretest students to assess their present knowledge of the subject.

C. Provide students with objective sheet.

D. Provide students with information, assignment, and job sheets.

E. Discuss unit and specific objectives.

F. Discuss information sheet.

   (NOTE: Individualize instruction for students with special needs.)

G. Discuss assignment sheets.

H. Set up arms.

   (NOTE: Follow directions provided with arms.)

I. Lay out equipment for ease of use.

J. Demonstrate and discuss procedures outlined in job sheets.

K. Give test.

L. Discuss test.

M. Reteach if necessary.

II. Instructional materials

   A. Objective sheet

   B. Suggested activities

   C. Information sheet

   D. Assignment Sheet #1--Document Monitering and Maintenance of IV Therapy

   E. Answers to assignment sheet

SUGGESTED ACTIVITIES

F. Job sheets

  1. Job Sheet #1--Perform Daily Care for IV Site and Tubing

  2. Job Sheet #2--Replace IV Tubing with ONC in Place

  3. Job Sheet #3--Discontinue IV Needle or Catheter

  4. Job Sheet #4--Remove Air from Tubing by Rolling Tubing Around Pen or Pencil

  5. Job Sheet #5--Remove Air from Tubing by Manipulating Air into Drip Chamber

  6. Job Sheet #6--Remove Air from Tubing by Using a Needle

G. Test

H. Answers to test

III. Unit references

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SUGGESTED ACTIVITIES

IV. Additional reading material

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MONITORING AND MAINTENANCE OF THE IV
UNIT X

INFORMATION SHEET

I. Terms and definitions

A. Auscultate--To listen to

B. Distress--State of danger or trouble

C. Documentation--Anything written to record or prove something

D. Elicit--To draw forth

E. Gauge--Measure; dimensions

F. Hemodynamic--Forces involved in the circulation of blood through the body

G. Increments--Increases or additions in number, size, or volume

H. Manipulate--To work or operate with the hands

I. Misinterpretation--Understanding incorrectly

J. Mobility--Ability to move

K. Notation--Brief written statement, comment, or explanation

L. Patency--State of being freely open; unobstructed

M. Rale--Abnormal breath sound heard when listening to the chest

N. Stable--Not changing

O. Stationary--Not moving; fixed

P. Status--State or condition

Q. Systemic--Of or affecting the body as a whole

R. Tolerance--Capacity for enduring a large amount of a substance without an adverse effect

S. Viscosity--State of being sticky or gummy

(NOTE: The higher the viscosity, the greater the resistance to flow.)

II. Abbreviations associated with IV therapy

A. c̄--With

B. HOB--Head of bed

INFORMATION SHEET

C. I & O--Intake and output

D. $\bar{s}$--Without

E. $\bar{q}$--Every

III. Guidelines for maintaining prescribed flow rate

(NOTE: The doctor prescribes a flow rate for a specific reason. It is then the nurse's responsibility to monitor and maintain that flow rate.)

A. Use a timing strip

(NOTE: Use a timing strip even when using an infusion pump. These strips provide a quick method for checking whether or not the correct amount has infused in the correct time period. For greater accuracy, mark these strips in hourly increments.)

(CAUTION: When using a manufacturer's timing strip, you must make sure that it is on the appropriate container. An Abbott strip cannot be used with a Cutter bottle, and a Travenol glass-bottle strip cannot be used with a Travenol plastic bag.)

B. Calculate flow rate in drops per minute, and then count out the drops per minute when using the gravity flow and clamp system

(NOTE: Monitor the drops per minute as well as the total amount infused each time the container is checked.)

C. Check IV container and tubing for flow rate at least once an hour

(NOTE: Obtain and know your hospital's policy.)

D. Maintain appropriate distance between container and insertion site

(NOTE: The container should be kept 2 1/2 feet to 3 feet above the insertion site.)

E. Provide enough tubing to allow the patient free movement

EXAMPLE: Extension tubings

(NOTE: Calculating the correct length of tubing is very important. If tubing is too short, the patient could accidently pull the needle or catheter out of the vein. If tubing is too long, the patient could turn over on it and pinch it off.)

F. Enlist patient's help and cooperation

INFORMATION SHEET

IV. Factors that influence flow rate

   A. Position of container in relation to insertion site

      1. Increasing the distance between container and site increases the flow rate

         EXAMPLE: Increasing the distance from 3 feet to 6 feet increases the flow rate by 400 percent.

      2. Decreasing the distance between container and site decreases the flow rate

         EXAMPLE: Decreasing the distance from 4 feet to 3 1/2 feet decreases the flow rate by 77 percent.

   B. Viscosity of fluid

      1. Increase causes resistance to flow

      2. Increase requires an increase in pressure to move fluid through tubing

         (NOTE: Hyperalimentation solutions and blood and blood products are viscous fluids that resist flow and require increased pressure.)

   C. Gauge of needle and/or catheter and use of filter

      1. Increase in pressure is required to move fluid through a small venous needle or catheter

      2. Increase in pressure is required to move fluid through a piggyback needle

      3. Increase in pressure is required to move fluid through a filter

V. Instructions about IV therapy to be given to the patient

   A. General

      1. Instruct patient to use other arm for tasks

         (NOTE: This instruction will vary with the type of needle or catheter used and the site of insertion.)

      2. Instruct patient to keep arm below level of heart

         (NOTE: Unless an infusion pump is used, an arm raised for an extended period will change the flow rate. However, raising the arm occasionally will not necessarily interfere with the IV.)

INFORMATION SHEET

3. Instruct patient not to disturb tape or dressing

4. Instruct patient to notify nurse if problems occur with equipment or insertion site

   EXAMPLES:
   a. Call if blood is noticed in tubing, on dressing, or on bed
   b. Call if IV stops running or begins to run very rapidly
   c. Call if burning or itching is noticed at insertion site
   d. Call if any wetness is noticed on dressing or bed
   e. Call if any connections or needles come loose

5. Instruct patient not to tamper with any of the equipment

   EXAMPLES: Control clamp, IV pole, infusion pump

   (NOTE: If the patient will not leave the clamp alone, place a piece of tape just under the clamp to keep it under the drip chamber and out of the patient's reach.)

B. Patient allowed out of bed

1. Instruct patient on how to move a mobile IV pole
2. Instruct patient on how to remove container from a stationary IV pole, how to carry container, and where to place container after reaching destination
3. Instruct patient on how to get out of bed properly
4. Instruct patient on how to put on gown, robe, and slippers

C. Patient restricted to bed--Instruct patient on how to move around in bed

(CAUTION: This instruction will depend upon the condition of the patient and the type of illness, surgery, or injury.)

VI. Nursing interventions with regard to increasing patient mobility

A. Keep bedside table and chairs on side of bed opposite insertion side

(NOTE: If patient requests that furniture be placed on the insertion side, place it there, but instruct the patient on how to move it out of the way.)

INFORMATION SHEET

B. Keep IV pole on insertion side of bed

C. Keep patient's robe and slippers close and on insertion side of bed

D. Tape all connections

(NOTE: Taping connections prevents accidental separation if the patient places any tension on the IV system.)

(CAUTION: If there is going to be any extra strain on the tubing, tape the tubing to the IV pole.)

VII. Routine care of the IV system

(NOTE: Each institution has a policy for daily care of solution, tubing, and site. Be sure to obtain and know this policy.)

A. Change IV solution every twenty-four hours

(NOTE: A twenty-four-hour solution change usually applies only to very low-flow-rate IVs such as keep vein open (KVO); other solutions are changed more frequently.)

B. Change IV tubing every twenty-four hours (Job Sheets #1 and #2)

C. Clean, inspect, and redress insertion site every twenty-four hours

(NOTE: When transparent dressings such as Op-Site or Tegaderm are used, they are left in place until the IV is discontinued.)

D. Change IV insertion site at least every seventy-two hours

(NOTE: The insertion site must be changed more frequently if any signs of phlebitis are noted or if irritating solutions or medications are being infused.)

E. Relabel solution, tubing, and site every time any part of the system is changed

F. Use strict aseptic technique whenever handling any part of the IV system

G. Discontinue IV as necessary (Job Sheet #3)

H. Restart IV as necessary

VIII. Nursing interventions with regard to monitoring IV system and patient

A. Check status of IV thirty minutes after IV line is established

INFORMATION SHEET

B. Check status of IV for flow rate and volume delivered at least every hour during your shift

(NOTE: On a busy unit, it is very difficult to check the patient and IV every hour, but a patient with an IV line must be one of your top priorities.)

(CAUTION: Do not try to catch up a large volume in a short time. Adjust the rate to slowly catch up the volume over a longer period of time. Adjustments in the flow rate require more frequent checking of the status of the IV and patient.)

C. Check status of patient for local and systemic complications

D. Check patient's psychological tolerance of IV therapy

(NOTE: Check patient for tolerance of limited mobility, adherence to instructions, and any untoward reactions. This status check should be done thirty minutes after establishment of line and then at least twice a shift.)

E. Monitor for hemodynamic changes

(NOTE: Observe patient for respiratory distress with every status check. Auscultate the chest for breath and heart sounds at least twice per shift or if any signs of distress are noted.)

F. Check patency of needle or catheter

(NOTE: This check must be done before administration of medication and whenever there is any doubt about patency. Techniques for checking needle or catheter patency are outlined in Unit VIII, Job Sheets #1-#3.)

G. Check stability of solution

(NOTE: Monitor solution for any physical changes such as crystals, color change, or gas release [bubbles].)

H. Check for air in tubing (Job Sheets #4-#6)

(NOTE: Air may enter tubing and cause an air embolus if container empties before bottle is changed.)

I. Monitor urine output

(NOTE: Patients on IV therapy should be on I & O to check the status of their hydration.)

INFORMATION SHEET

IX. Chart forms and information required in documenting the monitoring and maintenance of IV therapy (Assignment Sheet #1)

(NOTE: Documentation on the chart of all phases of IV therapy is an extremely important part of therapy.)

A. Nurses notes

1. Frequency of status check

(CAUTION: To protect yourself, the patient, and the hospital, it is very important to note how often you check the IV.)

EXAMPLE: IV checked q̄ 1 hr

(NOTE: This notation can be made in the summary charting at end of shift.)

2. Flow rate setting

EXAMPLE: IV set to run at 100 ml/hr

3. Volume being delivered

EXAMPLES: a. 12 A.M.--IV infusing well. 400 ml infused as prescribed.

b. 12 A.M.--IV infusing behind schedule. 300 ml infused. IV set to run at 125 ml/hr.

(NOTE: Make a notation of volume delivered at least twice a shift.)

4. Location of insertion site

5. Lack of complications at site

EXAMPLE: IV infusing well with no redness, leaking, or swelling noted at site.

(NOTE: This notation can be made at the beginning and end of your shift.)

6. Complications at the site and any interventions for those complications

EXAMPLE: 6 P.M.--IV dressing wet. Dressing removed. All connections intact. Leaking of fluid at insertion site noted. IV dc'd and restarted in upper "L" arm c̄ new tubing and #20 Jelco. Gauze 2x2 dressing applied over discontinued insertion site.

INFORMATION SHEET

7. Systemic-type complications and interventions for these complications

EXAMPLE: 10 A.M.--Respiratory rate increased to 28, sl labored. Anxious. Dry, hacky cough. Rales heard in both lung bases. Heart tones--good gallop noted. HOB elevated, and arms placed on pillows. Reassured. IV rate decreased to KVO. Doctor Right notified--orders.

8. Tolerance by patient and understanding of limitations

EXAMPLES: a. 11 A.M.--Upset because he cannot go to the bathroom. Explained to him that doctor wants him to stay in bed for at least twenty-four hours because of the tubes, NG, Foley, IV, and recent surgery.

b. 11 A.M.--Understands the reasons for limitation of mobility by stating, "I sure am weak. I couldn't go anywhere by myself, even if I didn't have this IV."

9. Hemodynamic changes

(NOTE: This notation should be made whenever an assessment is done.)

EXAMPLE: 5 A.M.--Awake. Respiratory rate 16 and not labored. Breath sounds are clear. Heart tones good--no extra sounds noted.

10. Patency of needle or catheter and any interventions carried out

(NOTE: This notation should be made at the beginning or end of your shift, when patency is in doubt, or whenever action must be taken.)

EXAMPLES: a. 10 P.M.--IV infusing well at scheduled rate. No swelling or redness noted at site.

b. 10 P.M.--IV infusing slowly. No swelling noted at IV site. Temperature of IV site slightly cool. Checked for patency--infiltrated. IV dc'd and restarted in "L" upper forearm c̄ #20 Abbocath and new tubing. "R" arm elevated on pillow, and warm wet compress applied as per standing order for infiltration.

11. Stability of solution

(NOTE: This notation can be made at the beginning, middle, or end of your shift and combined with other IV notations.)

EXAMPLE: 3 P.M.--IV running well. No redness, leaking, or swelling noted at IV site. 800 ml solution infused this 8 hours. Solution clear s particulate matter noted.

INFORMATION SHEET

12. Education of patient

    (NOTE: This notation should be made when the venipuncture is performed and whenever patient education is reinforced.)

    EXAMPLE: IV of $D_5$1/2NS 1,000 ml started in "R" hand c̄ #20 Quick-Cath. Patient instructed not to tamper with control clamps, tape, or dressing. Instructed to call nurse if IV stops running or runs very fast; if blood is seen in tubing or on bed; if wetness is noticed on dressing or bed; if itching, pain, or swelling is noticed at the needle site; or if any connections come loose. Instructed to keep arm at side when not using it. Instructed to call nurse to assist her out of bed the first time. Understanding of instructions demonstrated by repeating the instructions.

13. Daily care of site and equipment

    (NOTE: This notation is usually made once a day, but a notation of the inspection, cleansing, and redressing of the site should be made any time the dressing is changed.)

    (CAUTION: If any solution is discarded when equipment is changed, a notation of this amount must be made.)

    EXAMPLE: D_5W 250 ml hung c̄ new tubing. 50 ml of previous solution discarded. Dressing removed and insertion site cleaned c̄ Betadine and alcohol. No redness, leaking, or swelling noted at site or under tape. Betadine oint. applied and site redressed and taped.

14. Questions, fears, and/or misinterpretations expressed by patient; your interventions; and patient's understanding of explanation

    EXAMPLE: 2 A.M.--Patient stated, "I'm going to die aren't I?" When asked why she would think this, she stated, "Only really sick people have these intravenous tubes." Patient reassured that not all patients c̄ an IV are really sick and that her IV was to give her medications so they could make her well more quickly than when taken by mouth. She expressed understanding by stating, "Oh thank heavens. I was sure I was going to die."

B. Medication or IV sheets

1. Type and amount of solution hung
2. Date and time solution hung
3. Tubing change
4. Amount of solution left at end of shift

   (NOTE: This amount can be recorded in many different places, depending upon individual hospital policy. Know and follow your hospital's policy.)

INFORMATION SHEET

C. I & O record

1. Amount of solution patient has received on your shift

2. Urine output

   (NOTE: The patient does not have to have a urinary catheter in order for you to measure output. Place measuring device on the stool, and instruct patient to call the nurse to empty the urine.)

3. Intake other than IV

4. Output other than urine

MONITORING AND MAINTENANCE OF THE IV
UNIT X

ASSIGNMENT SHEET #1--DOCUMENT MONITORING AND MAINTENANCE OF IV THERAPY

NAME ______________________________ SCORE ______________

This assignment sheet will give you practice in the everyday documentation of IV therapy and will help prevent you from making errors on an actual patient's chart.

CASE STUDY:

The patient is a sixty-nine-year-old woman from a small rural community. This is her first hospitalization. She has been admitted for cholecystitis. A cholecystectomy was performed, and this is her second post-op day. The IV orders are 1,000 ml D_5RL, 1,000 ml D_5 1/2NS, 1,000 ml Normosol-R. Alternate 8 $\bar{q}$ hr. Bathroom privileges are allowed. She is NPO. You are her nurse and are working the three-to-eleven shift. The IV infiltrates at 11 P.M.

Write, on the sample hospital forms, the appropriate documentation of the IV therapy for your shift. An IV solution is due at 4 P.M. You may choose any of the ordered solutions. The IV tubing is due to be changed at 5 P.M.

ASSIGNMENT SHEET #1

XYZ MEDICAL CENTER
NURSES NOTES

DATE	TIME	NOTES

ASSIGNMENT SHEET #1

XYZ MEDICAL CENTER
NURSES NOTES

DATE	TIME	NOTES

ASSIGNMENT SHEET #1

XYZ MEDICAL CENTER
MEDICATION SHEET

Date	Medications or IV Solutions	IV Tubing Change	7-3	3-11	11-7

Nurse's Name	Shift	Initial	Nurse's Name	Shift	Initial	Nurse's Name	Shift	Initial

ASSIGNMENT SHEET #1

XYZ MEDICAL CENTER
INTAKE AND OUTPUT SHEET

DATE		INTAKE					OUTPUT						
	Oral	IV			IV LTC	Total	Urine	NG	Chest	Drain			Total
7-3													
3-11													
11-7													
24-Hr Total													
Date						Total							Total
7-3													
3-11													
11-7													
24-Hr Total													
Date						Total							Total
7-3													
3-11													
11-7													
24-Hr Total													

MONITORING AND MAINTENANCE OF THE IV
UNIT X

ANSWERS TO ASSIGNMENT SHEET

(NOTE: Documentation on the nurses notes can vary among students and not be wrong. The answer must be evaluated by the instructor on an individual basis. The following answers are just a sample. The answer on the medication sheet must be exact except for chosen solution. The IV amount recorded on the I & O sheet must be exact. If student charts urine, it may be any amount.)

XYZ MEDICAL CENTER
NURSES NOTES

DATE	TIME	NOTES
11/27/81	4 P.M.	IV hung c̄ new tubing, all previous solution infused. IV dressing removed & site cleaned c̄ Betadine & alcohol. No signs of redness swelling, or leaking noted at site. Betadine oint. applied to insertion site & redressed & taped. Instructed to call nurse if burning or itching noted at site. States, "I sure will." VS stable--no respiratory distress noted. Heart sounds good s̄ extra sounds. Instructed to move frequently from side to side & to call for help in going to BR.
	6 P.M.	Up to BR c̄ help--voided 300 ml clear, yellow urine. IV site unchanged from 4 P.M. States, "This IV is a pain in the neck." Explained to her that IV is essential at present to give her the fluids she couldn't take by mouth.
	8 P.M.	Sleeping. Respirations adequate and deep at 16. No change in IV site.
	10 P.M.	IV site s̄ swelling, redness, or leaking. IV was checked q̄ 1 hr during shift. IV infusing well at 125 ml an hour. 1,000 ml infused this shift. Up to BR c̄ help; voided 250 ml clear, yellow urine. VS stable throughout shift--refer to VS sheet. No respiratory distress noted. Heart sounds good s̄ extra sounds.
	11 P.M.	C/o IV burning. IV site sl swollen & IV not infusing well. Checked for patency & IV infiltrated. Dc'd & restarted c̄ new tubing & #20 Jelco in "L" forearm, using clear IV solution that was hung at 4 P.M. Gauze 2x2 dressing applied over previous insertion site. Tolerated procedure well & stated, "Thank you, that feels so much better."

B. Galliart, RN

ANSWERS TO ASSIGNMENT SHEETS

XYZ MEDICAL CENTER
MEDICATION SHEET

Date	Medications or IV Solutions	IV Tubing Change	7-3	3-11	11-7
11/27/81	D_5W/NS 1,000 ml	4 P.M. 11 P.M.		4 00/BG	

Nurse's Name	Shift	Initial	Nurse's Name	Shift	Initial	Nurse's Name	Shift	Initial
B. Galliart, RN	3-11	BG						

ANSWERS TO ASSIGNMENT SHEETS

XYZ MEDICAL CENTER
INTAKE AND OUTPUT SHEET

DATE	11/21/81	INTAKE					OUTPUT						
	Oral	IV			IV LTC	Total	Urine	NG	Chest	Drain			Total
7-3													
3-11	NPO	1000			125	1000	550						550
11-7													
24-Hr Total													
Date						Total							Total
7-3													
3-11													
11-7													
24-Hr Total													
Date						Total							Total
7-3													
3-11													
11-7													
24-Hr Total													

MONITORING AND MAINTENANCE OF THE IV
UNIT X

JOB SHEET #1--PERFORM DAILY CARE FOR IV SITE AND TUBING

I. Equipment

  A. Prescribed IV solution

  (NOTE: Schedule tubing change when solution is to be changed if at all possible.)

  B. Appropriate IV tubing

  C. Gauze 2x2

  D. Gauze 4x4

  E. Povidone iodine and alcohol prep sponges--two of each

  F. Antimicrobial ointment

  G. Tape

II. General procedure

  A. Identify patient's need for care by using appropriate communication tool

  B. Obtain equipment and take to room

  C. Identify yourself to patient and family

  D. Identify patient

  E. Explain procedure to patient

  F. Wash hands

  G. Prepare solution and tubing

  H. Prepare tape and dressing

JOB SHEET #1

I. Open gauze 4x4 and place in readily accessible area

(NOTE: Open package, keeping inside of packaging sterile.)

J. Open prep sponges and lay them on open gauze 4x4 package opposite the gauze 4x4

K. Enlist patient's help

(NOTE: If patient is uncooperative, obtain the help of another nurse.)

L. Remove splints or restraints if in place

M. Remove tape

(NOTE: Leave in place the two 1/2-inch pieces of tape that secure the catheter, or the tape securing the wings of the wing-tipped needle. See Figures 1 and 2.)

FIGURE 1

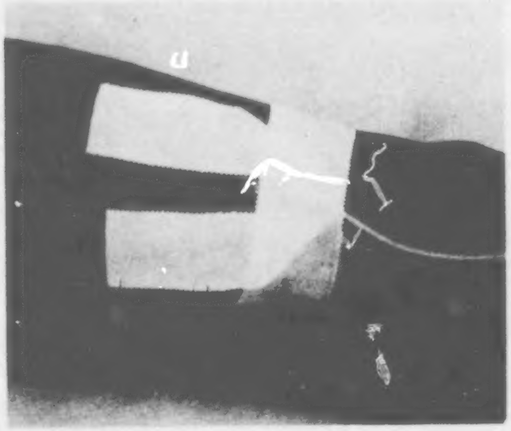
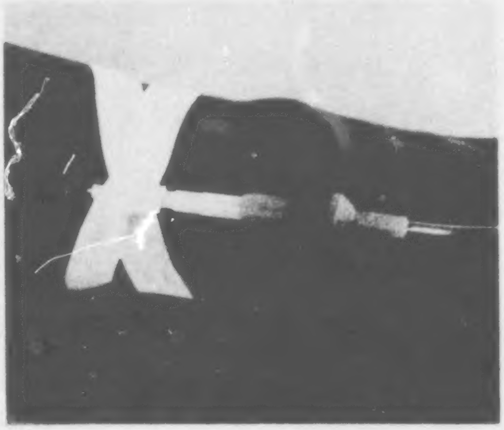


FIGURE 2



N. Inspect the insertion site for

1. Phlebitis
2. Infiltration
3. Infection
4. Local allergic skin reactions

O. Cleanse insertion site gently with prep sponges

(NOTE: Use a circular motion and the clean-to-dirty technique.)

JOB SHEET

P. Allow to air dry

Q. Cleanse most of povidone iodine off site, using alcohol sponges

R. Allow to air dry

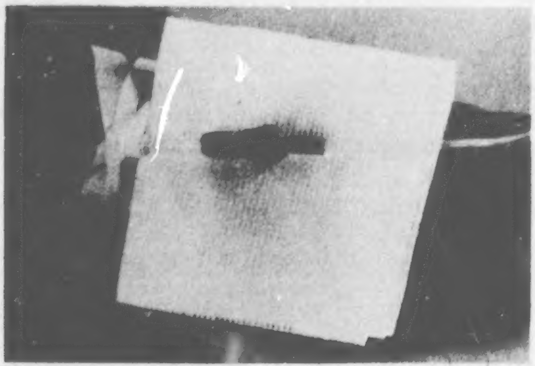
S. Turn off flow-control clamp on tubing to be replaced

III. Procedure for ONC

A. Slip gauze 4x4 under the catheter hub and distal tip of old tubing (Figure 3)

(NOTE: This procedure provides a clean field, and sponge absorbs any backflow of blood from the catheter.)

FIGURE 3



B. Remove protective cap from distal tip of new tubing and place tubing between second and third fingers of nondominant hand (Figure 4)

(CAUTION: Carefully avoid touch contamination.)

FIGURE 4

JOB SHEET #1

C. Quickly remove from ONC hub the tubing to be replaced; insert new tubing

(NOTE: Hold needle hub securely with thumb and first fingers of nondominant hand to avoid any possible movement of the needle in the vein.)

(CAUTION: Secure tubing into needle hub, but make sure that it is not too tight to be removed again. Carefully avoid touch contamination.)

IV. Procedure for wing-tipped needle

A. Remove protective cap from distal tip of new tubing

B. Remove tubing to be replaced from female adapter of wing-tipped needle

C. Quickly slip distal tip of tubing into female adapter of wing-tipped needle

D. Tape this connection

(NOTE: New guidelines from the Center for Disease Control in Atlanta may be published soon on a policy for tubing change every forty-eight hours. Obtain and know your hospital's present policy.)

V. General procedure after new tubing is securely in place

A. Open flow-control clamp wide open for two to three seconds

(NOTE: Opening the clamp briefly flushes any blood from the needle or catheter.)

B. Establish a moderate flow rate

C. Apply antimicrobial ointment to insertion site

D. Proceed with dressing and taping as outlined in Unit VII, Job Sheets #8 and #10

E. Establish the prescribed flow rate

F. Label IV site, tubing, and container

G. Reapply splints or restraints if required

H. Dispose of used equipment in the appropriate place

I. Wash hands before leaving room

J. Document your actions, observations, and instructions to patient as outlined in this unit

MONITORING AND MAINTENANCE OF THE IV
UNIT X

JOB SHEET #2--REPLACE IV TUBING WITH ONC IN PLACE

I. Equipment

A. Appropriate IV tubing

B. Gauze 2x2

C. Gauze 4x4

D. Alcohol prep sponge

(NOTE: An alcohol prep sponge is needed only if IV solution is in glass bottle.)

E. Antimicrobial ointment

F. Tape

II. Procedure

(NOTE: IV tubing will occasionally have to be changed between scheduled time for daily care.)

EXAMPLE: A change to an infusion pump that requires special tubing to administer blood

A. Identify patient's need for tubing change by using appropriate communication tool

B. Obtain equipment and take to room

C. Identify yourself to patient and family

D. Identify patient

E. Explain procedure to patient

F. Wash hands

G. Set the flow-control clamp to a keep-open rate on tubing to be changed

H. Remove new tubing from its packaging

I. Move up flow-control clamp to just under drip chamber

J. Prepare a piece of tape approximately 4 inches long; place in readily accessible area

K. Open alcohol sponge, if solution is in glass bottle, and place in a readily accessible area

JOB SHEET #2

L. Remove IV container from pole

(NOTE: Place glass IV container on a solid surface such as the over-the-bed table.)

M. Remove from the container the spike of tubing to be changed

N. Remove protective cap from spike of new tubing

O. Place protective cap from new tubing spike on spike of tubing to be changed

(NOTE: If the protective cap is contaminated, a sterile needle can be used as a cap.)

(CAUTION: Carefully avoid touch contamination.)

P. Suspend tubing to be changed from pole, by taping it to pole with previously prepared 4-inch piece of tape

Q. If using a glass bottle, cleanse spike port of container with alcohol prep sponge

R. Spike container with new tubing

S. Suspend container from IV pole

T. Fill tubing with IV solution, and place in a readily accessible area

U. Prepare tape and dressing, and place in a readily accessible area

V. Enlist patient's help

(NOTE: If patient is uncooperative, obtain the help of another nurse.)

W. Remove splints or restraints if in place

X. Remove tape

(NOTE: Leave the two 1/2-inch pieces of tape that secure the catheter in place.)

Y. While dressing is off, inspect site for any of the following complications

1. Phlebitis
2. Infiltration
3. Infection
4. Local allergic skin reactions

JOB SHEET #2

Z. Slip gauze 4x4 under catheter hub and distal tip of tubing to be replaced

(NOTE: This procedure provides a clean field, and sponge will absorb any backflow of blood from the catheter.)

AA. Turn off flow control clamp on tubing to be replaced

BB. Remove protective cap from distal tip of new tubing, and place this tubing between the second and third fingers of nondominant hand

(CAUTION: Carefully avoid touch contamination.)

CC. Quickly remove from the catheter tubing to be replaced, and insert new tubing

(NOTE: Hold needle hub securely with thumb and first finger of nondominant hand to avoid any possible movement of the needle in the vein.)

(CAUTION: Secure tubing into needle hub, but make sure that it is not too tight to be removed again. Carefully avoid touch contamination.)

DD. Open flow-control clamp wide open for two to three seconds

(NOTE: Opening the flow-control clamp will flush any blood from the needle or catheter.)

EE. Establish a moderate flow rate

FF. Apply antimicrobial ointment to insertion site

GG. Proceed with dressing and taping as outlined in Unit VII, Job Sheets #8 and #10

HH. Establish the prescribed flow rate

II. Relabel IV site and tubing

JJ. Reapply splints or restraints as required

KK. Dispose of used equipment in appropriate place

LL. Wash hands before leaving room

MM. Document your actions, observations, and instructions to patient as outlined in this unit

MONITORING AND MAINTENANCE OF THE IV
UNIT X

JOB SHEET #3--DISCONTINUE IV NEEDLE OR CATHETER

I. Equipment

A. Two gauze 2x2s

B. Tape--1-inch width

II. Procedure

A. Identify patient's need for discontinuance of IV therapy by checking doctor's original order

B. Obtain equipment and take to room

C. Identify yourself to patient and family

D. Identify patient

E. Wash hands

F. Explain procedure to patient

G. Turn off flow-control clamp on IV tubing

H. Open gauze 2x2s, being careful to maintain sterility; place in a readily accessible area

I. Prepare a 4-inch to 6-inch piece of tape, and place in a readily accessible area

J. Carefully remove tape and dressing from IV site

K. Remove tape from hub of catheter or wings of needle

(CAUTION: To prevent possible damage to the vein, avoid manipulation of the needle or catheter when removing this tape.)

JOB SHEET #3

L. Grasp needle hub or pinch wings of needle together with thumb and first finger of dominant hand

M. Place folded gauze 2x2 lightly over insertion site

(CAUTION: Do not apply pressure at this time.)

N. Use a slow, steady pull, and remove needle or catheter from vein

O. Apply pressure to venipuncture site as soon as tip of needle or catheter *clears* the skin

P. Apply pressure for approximately thirty seconds to one minute

(NOTE: If patient has been or is on an anticoagulant, pressure may need to be applied for three minutes to five minutes.)

(CAUTION: If bleeding occurs after the pressure is removed, reapply pressure until bleeding stops, or apply a folded gauze 2x2 with tape as a pressure dressing until bleeding stops.)

Q. Apply gauze 2x2 lightly over insertion site, using the 4-inch to 6-inch piece of tape

(NOTE: Obtain and know your hospital's policy regarding the application of a dry sterile dressing after discontinuing the IV.)

R. Inspect catheter to ensure that device is intact

S. Discard used equipment in appropriate place

T. Wash hands before leaving room

U. Document your actions and assessments on the proper chart form

MONITORING AND MAINTENANCE OF THE IV
UNIT X

JOB SHEET #4--REMOVE AIR FROM TUBING BY ROLLING TUBING AROUND PEN OR PENCIL

I. Equipment

  A. Pencil or long pen

  B. IV solution as ordered

II. Procedure

  A. Obtain equipment and take to room

  B. Follow correct procedure to check solution and container

  C. Wash hands

  D. Spike new solution with present tubing after removing empty container

  E. Fill drip chamber

  F. Find level of fluid in tubing

  G. Move flow control clamp down to about 6 inches below fluid level

  H. Close clamp

  I. Move IV pole to its lowest position

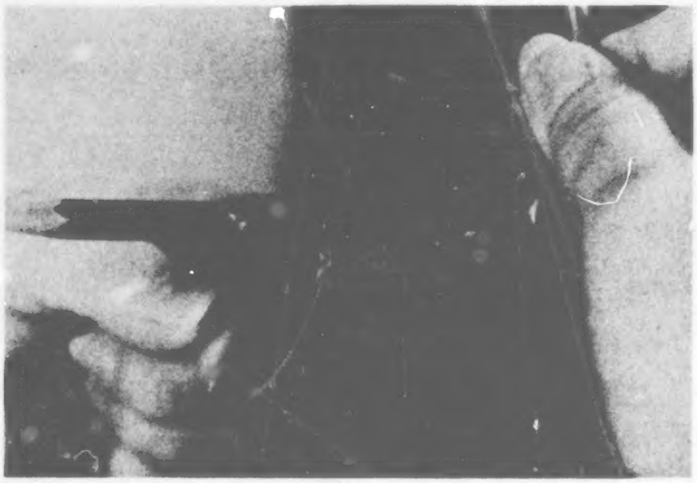
  J. Place tubing over pencil or pen approximately 3 inches to 4 inches below fluid level

JOB SHEET #4

K. Tightly wind tubing around pencil or pen (Figure 5)

(NOTE: Winding the tubing around a pen or pencil compresses the tubing and forces the air up into the drip chamber.)

FIGURE 5



L. Unwind pencil after tubing is free of air

(NOTE: Tubing will be curled and even kinked, but simple manipulation will unwind it.)

M. Use fingers to pinch tubing shut below flow-control clamp

N. Move flow-control clamp back up under drip chamber and close

(NOTE: Tubing is now ready for the administration of the solution.)

O. Move IV pole back up to its original position

P. Reset flow-control clamp to prescribed rate

Q. Discard used equipment in appropriate place

R. Wash hands before leaving room

MONITORING AND MAINTENANCE OF THE IV
UNIT X

JOB SHEET #5--REMOVE AIR FROM TUBING BY MANIPULATING AIR INTO DRIP CHAMBER

I. Equipment--IV solution as ordered

II. Procedure

(NOTE: This method is very time consuming if there is a large amount of air in the tubing.)

A. Obtain solution and take to room

B. Follow correct procedure for checking solution and container

(NOTE: This procedure is outlined in Unit V, Job Sheet #1.)

C. Wash hands

D. Spike new solution with present tubing after removing empty container

E. Find level of fluid in tubing

F. Pinch tubing shut with fingers about 12 inches below fluid level (Figure 6)

FIGURE 6

JOB SHEET #5

G. Move flow-control clamp down to about 6 inches below fluid level; close clamp

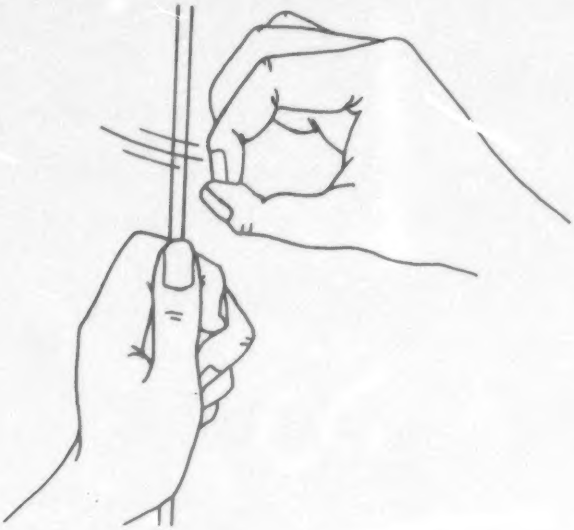
H. Refill drip chamber with new solution

I. Apply gentle tension downward on IV tubing

J. Flick tubing gently with fingers (Figure 7)

(NOTE: Air always moves upward and will enter drip chamber.)

FIGURE 7



K. After tubing is free of air, use fingers to pinch tubing shut below flow control clamp

L. Move flow-control clamp up under drip chamber and close

M. Reset flow-control clamp to prescribed rate

N. Discard used equipment in appropriate place

O. Wash hands before leaving room

MONITORING AND MAINTENANCE OF THE IV
UNIT X

JOB SHEET #6--REMOVE AIR FROM TUBING BY USING A NEEDLE

(CAUTION: This technique involves entering the IV line. It should be used only if all other methods cannot be used.)

I. Equipment

- A. 20-gauge needle
- B. Alcohol sponge
- C. Two gauze 4x4s
- D. IV solution as ordered

II. Procedure

- A. Obtain equipment and take to room
- B. Follow correct procedure to check solution and container

  (NOTE: This procedure is outlined in Unit V, Job Sheet #1.)
- C. Wash hands
- D. Turn off flow-control clamp
- E. Spike new solution with present tubing after removing empty container
- F. Refill drip chamber
- G. Find level of fluid in tubing
- H. Find a secondary port or use flashback (Travenol tubing) below this fluid level
- I. Cleanse this port with alcohol sponge
- J. Lay or hold the gauze 4x4s under chosen secondary port or flashback

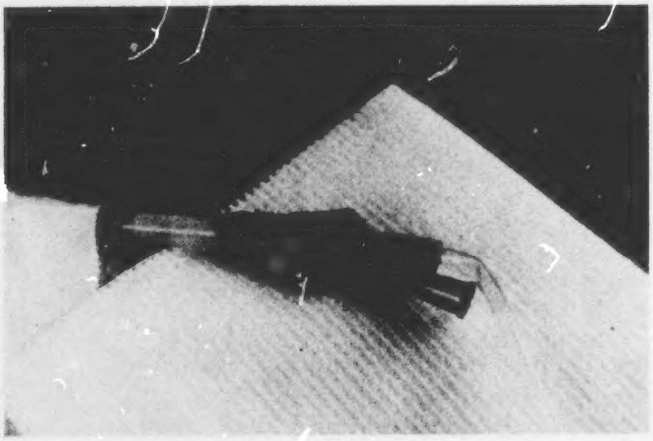
JOB SHEET #6

K. Insert the 20-gauge needle into the secondary port or flashback (Figure 8)

(NOTE: The fluid below the air will flow out first, and then the air will gush out, followed by fluid.)

FIGURE 8

Needle in Flashback



L. Open flow-control clamp

M. Close flow-control clamp as soon as air is all out

N. Remove needle

O. Reset flow-control clamp to prescribed rate

P. Discard used equipment in appropriate place

Q. Wash hands before leaving room

MONITORING AND MAINTENANCE OF THE IV
UNIT X

TEST

NAME______________________________________ SCORE ______________

1. Match to their correct definitions terms associated with monitoring and maintenance of the IV. Write the correct numbers in the blanks.

_____ a. State of being sticky or gummy

_____ b. Abnormal breath sound heard when listening to the chest

_____ c. State of danger or trouble

_____ d. Understanding incorrectly

_____ e. Increases or additions in number, size, or volume

_____ f. Forces involved in the circulation of blood through the body

_____ g. Measure; dimensions

_____ h. Ability to move

_____ i. Of or affecting the body as a whole

_____ j. Anything written to record or prove something

_____ k. To work or operate with the hands

_____ l. State of being freely open; unobstructed

_____ m. To draw forth

_____ n. State or condition

_____ o. Not changing

_____ p. Not moving; fixed

_____ q. Capacity for enduring a large amount of a substance without an adverse effect

_____ r. To listen to

_____ s. Brief written statement, comment, or explanation

1. Misinterpretation
2. Notation
3. Increments
4. Viscosity
5. Gauge
6. Mobility
7. Manipulate
8. Stationary
9. Elicit
10. Auscultate
11. Distress
12. Hemodynamic
13. Tolerance
14. Patency
15. Stable
16. Status
17. Documentation
18. Systemic
19. Rale

TEST

2. Match abbreviations associated with IV therapy to their correct terms. Write the correct numbers in the blanks.

_____a. $\bar{c}$

_____b. HOB

_____c. I & O

_____d. $\bar{s}$

_____e. $\bar{q}$

1. Without
2. With
3. Every
4. Head of bed
5. Intake and output

3. State guidelines for maintaining prescribed flow rate.

a. ____

b. ____

c. ____

d. ____

e. ____

f. ____

4. Discuss factors that influence flow rate.

a. Position of container in relation to insertion site--____________________

____

____

b. Viscosity of fluid--____________________________

____

____

c. Gauge of needle and/or catheter and use of filter--____________________

____

____

____

TEST

5. State instructions about IV therapy to be given to the patient.

   a. General

      1) ____________________

      ____

      2) ____________________

      ____

      3) ____________________

      ____

      4) ____________________

      ____

      5) ____________________

      ____

   b. Patient allowed out of bed

      1) ____________________

      ____

      2) ____________________

      ____

      3) ____________________

      ____

      4) ____________________

      ____

   c. Patient restricted to bed-- ____________________

   ____

6. Describe nursing interventions with regard to increasing patient mobility.

   a. ____________________

   b. ____________________

   c. ____________________

   d. ____________________

TEST

7. Discuss routine care of the IV system.

____

____

____

____

____

____

____

____

____

____

8. State nursing interventions with regard to monitoring IV system and patient.

a. ____

b. ____

c. ____

d. ____

e. ____

f. ____

g. ____

h. ____

i. ____

9. Distinguish among chart forms and information required in documenting the monitoring and maintenance of IV therapy. Place an "NN" in the blank to show "Nurses Notes." Place an "IVS" in the blank to show "Medication" or "IV sheets." Place an "I & O" in the blank to show "Intake & Output Sheet."

_____a. Type and amount of solution hung

_____b. Amount of solution patient has received on your shift

_____c. Complications at the site and any interventions for those complications

TEST

______d. Daily care of site and equipment

______e. Urine output

______f. Flow rate setting

______g. Hemodynamic changes

______h. Date and time solution hung

______i. Stability of solution

______j. Systemic-type complications and interventions for these complications

______k. Tubing change

______l. Volume being delivered

______m. Intake other than IV

______n. Frequency of status check

______o. Questions, fears, and/or misinterpretations expressed by patient; your interventions; and patient's understanding of explanation

______p. Amount of solution left at end of shift

______q. Lack of complications at site

______r. Tolerance by patient and understanding of limitations

______s. Output other than urine

______t. Patency of needle or catheter and any interventions carried out

______u. Education of patient

______v. Location of insertion site

(NOTE: Test questions 10 and 11 are the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

10. Document monitoring and maintenance of IV therapy.

11. Demonstrate the ability to

    a. Perform daily care for IV site and tubing.

    b. Replace IV tubing with ONC in place.

    c. Discontinue IV needle or catheter.

TEST

d. Remove air from tubing by rolling tubing around pen or pencil.

e. Remove air from tubing by manipulating air into drip chamber.

f. Remove air from tubing by using a needle.

MONITORING AND MAINTENANCE OF THE IV
UNIT X

ANSWERS TO TEST

1. a. 4
   b. 19
   c. 11
   d. 1
   e. 3
   f. 12
   g. 5
   h. 6
   i. 18
   j. 17
   k. 7
   l. 14
   m. 9
   n. 16
   o. 15
   p. 8
   q. 13
   r. 10
   s. 2

2. a. 2
   b. 4
   c. 5
   d. 1
   e. 3

3. a. Use a timing strip
   b. Calculate flow rate in drops per minute, and then count out the drops per minute when using the gravity flow and clamp system
   c. Check IV container and tubing for flow rate at least once an hour
   d. Maintain appropriate distance between container and insertion site
   e. Provide enough tubing to allow the patient free movement
   f. Enlist patient's help and cooperation

4. Discussion should include the following
   a. Position of container in relation to insertion site
      1) Increasing the distance between container and site increases the flow rate
      2) Decreasing the distance between container and site decreases the flow rate

ANSWERS TO TEST

b. Viscosity of fluid

   1) Increase causes resistance to flow

   2) Increase requires an increase in pressure to move fluid through tubing

c. Gauge of needle and/or catheter and use of filter

   1) Increase in pressure is required to move fluid through a small venous needle or catheter

   2) Increase in pressure is required to move fluid through a piggyback needle

   3) Increase in pressure is required to move fluid through a filter

5. a. General

   1) Instruct patient to use other arm for tasks

   2) Instruct patient to keep arm below level of heart

   3) Instruct patient not to disturb tape or dressing

   4) Instruct patient to notify nurse if problems occur with equipment or insertion site

   5) Instruct patient not to tamper with any of the equipment

b. Patient allowed out of bed

   1) Instruct patient on how to move a mobile IV pole

   2) Instruct patient on how to remove container from a stationary IV pole, how to carry container, and where to place container after reaching destination

   3) Instruct patient on how to get out of bed properly

   4) Instruct patient on how to put on gown, robe, and slippers

c. Patient restricted to bed--Instruct patient on how to move around in bed

6. Description should include the following

a. Keep bedside table and chairs on side of bed opposite insertion side

b. Keep IV pole on insertion side of bed

c. Keep patient's robe and slippers close and on insertion side of bed

d. Tape all connections

ANSWERS TO TEST

7. Discussion should include the following

   a. Change IV solution every twenty-four hours

   b. Change IV tubing every twenty-four hours

   c. Clean, inspect, and redress insertion site every twenty-four hours

   d. Change IV insertion site at least every seventy-two hours

   e. Relabel solution, tubing, and site every time any part of the system is changed

   f. Use strict aseptic technique whenever handling any part of the IV system

   g. Discontinue IV as necessary

   h. Restart IV as necessary

8. a. Check status of IV thirty minutes after IV line is established

   b. Check status of IV for flow rate and volume delivered at least every hour during your shift

   c. Check status of patient for local and systemic complications

   d. Check patient's psychological tolerance of IV therapy

   e. Monitor for hemodynamic changes

   f. Check patency of needle or catheter

   g. Check stability of solution

   h. Check for air in tubing

   i. Monitor urine output

9. a.	IVS	i.	NN	p.	IVS
b.	I & O	j.	NN	q.	NN
c.	NN	k.	IVS	r.	NN
d.	NN	l.	NN	s.	I & O
e.	I & O	m.	I & O	t.	NN
f.	NN	n.	NN	u.	NN
g.	NN	o.	NN	v.	NN
h.	IVS				

ANSWERS TO TEST

10. Evaluated to the satisfaction of the instructor

11. Performance skills evaluated to the satisfaction of the instructor

IV MEDICATIONS
UNIT XI

UNIT OBJECTIVE

After completing this unit, the student should be able to apply correct principles for administering IV medications by using reference material, scheduling administration of drugs, and calculating drug doses and dilutions. This knowledge will be shown by completing assignment sheets and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with IV medications to their correct definitions.
2. Match abbreviations associated with IV medications to their correct terms.
3. Distinguish among ways drugs are used.
4. State the five "rights" of administering medications.
5. State three additional "rights" of administering IV medications.
6. List facts to determine about an IV medication before administration.
7. Select from a list safety measures to observe when administering an IV medication.
8. List medication information to be obtained in a nursing history.
9. Distinguish among methods of administering IV medications.
10. Match methods of administering IV medications to their correct administration guidelines.
11. State nursing responsibilities and interventions with regard to the administration of IV medications.
12. List the effects of drug incompatibilities.
13. Describe types of drug incompatibilities.
14. Discuss factors that affect compatibilities.
15. State reason for using buffers with IV medications.
16. State nursing responsibilities and interventions with regard to avoiding incompatibilities.

OBJECTIVE SHEET

17. Match to their correct definitions terms associated with untoward reactions.
18. Match to their correct descriptions types of untoward reactions and/or side effects.
19. Name the body systems affected by untoward reactions.
20. Select from a list nursing responsibilities and interventions with regard to untoward reactions.
21. State the formula for calculation of drug doses.
22. Use reference material to determine incompatabilities and appropriate nursing actions for IV administration of drugs.
23. Schedule the administration of drugs.
24. Calculate drug doses and dilutions.

IV MEDICATIONS
UNIT XI

SUGGESTED ACTIVITIES

I. Suggested activities

  A. Make transparency.

  B. Pretest students to assess their present knowledge of the subject.

  C. Provide students with objective sheet.

  D. Provide students with information and assignment sheets.

  E. Discuss unit and specific objectives.

  F. Discuss information and assignment sheets.

  G. Individualize instruction for students with special needs.

  H. Utilize reference material mentioned in Assignment Sheet #1 to discuss Assignment Sheet #1.

  I. Utilize artificial arms to provide students with more practice in giving IV push medications and setting up piggyback systems.

  (CAUTION: Only distilled water can be used with the artificial arms.)

  J. Invite a pharmacist to speak to students.

  (NOTE: You may want to ask a pharmacist to speak on reconstitution of drugs and/or incompatibilities.)

  K. Give test.

  L. Discuss test.

  M. Reteach if necessary.

II. Instructional materials

  A. Objective sheet

  B. Suggested activities

  C. Information sheet

  D. Transparency master: TM #1--Formula for Calculating Drug Doses

  E. Assignment sheets

    1. Assignment Sheet #1--Use Reference Material to Determine Incompatibilities and Appropriate Nursing Actions for IV Administration of Drugs

SUGGESTED ACTIVITIES

2. Assignment Sheet #2--Schedule the Administration of Drugs

3. Assignment Sheet #3--Calculate Drug Doses and Dilutions

F. Answers to assignment sheets

G. Test

H. Answers to test

III. Unit references

A. Cohen, Michael. "Medication Errors: Always Check for Drug Allergies." *Nursing81,* Vol. 11, No. 9 (August, 1981), p. 22.

B. Cohen, Michael. "Medication Error #16: Be Certain of Drug Administration Routes." *Nursing78,* Vol. 8, No. 10 (September, 1978), p. 240.

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D. Cohen, Michael. "Medication Error: Don't Leave Medications at the Patient's Bedside." *Nursing80,* Vol. 10, No. 10 (October, 1980), p. 13.

E. Cohen, Michael. "Medication Error #2: Know the Patient's Diagnosis Before You Administer the Drugs." *Nursing78,* Vol. 8, No. 12 (December, 1978), p. 74.

F. Cohen, Michael. "Medication Errors: Label IV Bags as Soon as You Add Medications to Them." *Nursing79,* Vol. 9, No. 11 (November, 1979), p. 22.

G. Gahart, Betty L. *Intravenous Medications: A Handbook for Nurses and Other Allied Health Personnel,* 2nd ed. St. Louis, Missouri: C. V. Mosby Company, 1977.

H. Geslot, Denise H., and Nancy P. McKinney. "Administering Parenteral Drugs." *American Journal of Nursing,* Vol. 72, No. 4 (April, 1972), pp. 788-790

I. Mar, Dexter D. "Intravenous Admixtures." *American Journal of Nursing,* Vol. 81, No. 3 (March, 1981), pp. 574-575.

J. Morris, Marilyn E. "Intravenous Drug Incompatibilities." *American Journal of Nursing,* Vol. 79, No. 7 (July, 1979), pp. 1288-1291.

K. Plumer, Ada L. *Principles and Practices of IV Therapy,* 2nd ed. Boston: Little, Brown & Co., 1970.

SUGGESTED ACTIVITIES

L. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management.* Philadelphia: J. B. Lippincott, 1980.

(NOTE: This book is an *absolute must* for any hospital as an excellent reference manual.)

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N. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary,* 14th ed. Philadelphia: F. A. Davis Co., 1981.

O. Vail, Penny, and Paul A. Cohen. "The Ins and Outs of Administering IV Bolus Injections." *Nursing81,* Vol. 11, No. 11 (November, 1981), pp. 124-130.

IV. Additional reading

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B. Newton, David W., and Marian Newton. "Route, Site and Technique: Three Key Decisions in Giving Parenteral Medications." *Nursing78,* Vol. 9, No. 7 (July, 1979), pp. 18-25.

C. O'Donnel, Lynne, and Bernice Papciak. "Continuous Morphine Infusion for Controlling Intractable Pain." *Nursing81,* Vol. 11, No. 8 (August, 1981), pp. 68-72.

D. Rodman, Morton J. "Latest Thinking on Drug Therapy Post MI." *RN,* Vol. 44, No. 1 (January, 1981), pp. 74, 82, 84, 90, 92, 96.

IV MEDICATIONS
UNIT XI

INFORMATION SHEET .

I. Terms associated with IV medications

A. Bolus--Rapid IV push

B. Congestive heart failure (CHF)--Condition in which the heart does not pump effectively

C. Concentration--Strength or density of a solution

D. Curative--Having the power to cure

E. Dilute--To thin down by mixing with another liquid

F. Document--Anything written to record or prove something

G. Metabolize--To change and then utilize substances entering the body

H. Method--Way of doing something

I. Mode--Method

J. Palliative--To lessen the pain or severity without curing

K. Precipitation--Separating out from a solvent

L. Reaction--Chemical change

M. Reconstitute--To restore or reconstruct by adding a substance

N. Route--Course; path; way

O. Sensitivity--Degree of reaction to stimuli

P. Therapeutic--Serving to cure or heal

Q. Titrate--To change flow rate to achieve a desired effect

R. Untoward--Unfortunate; unfavorable

II. Abbreviations

A. IM--intramuscular

B. IV--intravenous

C. SQ--subcutaneous

D. PO--orally; per os

E. ml--milliliter

INFORMATION SHEET

III. Ways drugs are used

- A. Diagnostic
  - 1. Determining function of an organ or organ system

    EXAMPLES: Dyes given for intravenous renal and gallbladder studies
  - 2. Determining if there is an ongoing disease process in an organ or organ system

    EXAMPLE: Tuberculin skin tests
- B. Prophylactic
  - 1. Preventing communicable diseases

    EXAMPLES: Vaccines, antibiotics
  - 2. Preventing complications before surgery or after illness, injury, or surgery

    EXAMPLES: Lidocaine, antibiotics, heparin
- C. Therapeutic
  - 1. Curative

    EXAMPLES: Antibiotics, chemotherapy
  - 2. Palliative

    EXAMPLES: Narcotics, chemotherapy
  - 3. Supportive

    EXAMPLE: Anesthetics
  - 4. Replacement

    EXAMPLES: Electrolytes, vitamins, insulin

IV. The five "rights" of administering medications

- A. Right medication
- B. Right dose
- C. Right route (method)

  EXAMPLES: IM, IV, SQ, PO

INFORMATION SHEET

D. Right time

E. Right patient

V. Three additional "rights" of administering IV medications

(NOTE: Often the doctor's order is not specific as to the method or mode for IV administration, and only rarely does it indicate the length of time of injection or infusion.)

EXAMPLES:
1. Gentamycin 80 mg IV q 8 hr
2. Digoxin 0.25 mg IV slowly now

A. Method or mode

EXAMPLES: Direct injection, intermittent infusion, continuous infusion

B. Length of injection or infusion time

C. Check for incompatibilities

VI. Facts to determine about an IV medication before administration

A. Average dose

B. Route of administration

(NOTE: Some drugs can be administered by one or more routes. Some drugs also require a change of diluent when the route is changed.)

(CAUTION: Make sure that the specific preparation is given by its intended route.)

EXAMPLES: Aminophylline, Librium

C. Length of time of injection or infusion

D. Expected action (effect)

E. Common untoward reactions (side effects)

F. Incompatibilities

VII. Safety measures to observe when administering an IV medication

(NOTE: Some hospitals prepare all piggyback medications in the pharmacy and then send the twenty-four hours' supply to the unit, ready for administration.)

A. Check medication communication tool with patient's Kardex before preparing medications

B. Do not talk during preparation

C. Never give medication from an unlabeled or illegibly labeled container

INFORMATION SHEET

D. Never give a medication without a doctor's order

E. Double-check any dose calculation with another nurse

F. Give only medications that you prepare, or medications prepared by pharmacy

(NOTE: When mixing a multidose vial, label the container legibly with the amount of drug per milliliter, diluent used, date and time mixed, patient's name, room number, bed number, hospital number, and your initials.)

G. Identify patient before administering a medication

(NOTE: Call the patient by name and have patient repeat his or her name to you. Verify the patient's identity by checking the hospital identification bracelet.)

H. Remain with patient until a direct injection is completed

I. Never leave a tray of medication unattended

J. Obtain nursing history with emphasis on drug allergies

(CAUTION: Be very specific with drugs that can cause catastophic reactions.)

K. Read medication label three times

EXAMPLES: *First* before taking from shelf or drawer
Second before dispensing dose into individual container
Third after dispensing dose into individual container

L. Always check IV needle or catheter and vein for patency before administering a medication

INFORMATION SHEET

M. Label an intermittent or continuous infusion container as soon as medication is added (Figure 1)

(NOTE: This label must contain the medication, dose, date, time, nurse's initials, patient's name, room number, and hospital number.)

EXAMPLE:

FIGURE 1

Ampicillin Gm ṫ
11/27/81 12 AM

B.Y.

Room 44-D
Brownton, Henry #22012

VIII. Medication information to be obtained in a nursing history.

A. Drug allergies or sensitivities

1. Previous problems with any drug(s)
2. Previous problems with specific drug(s) to be administered
3. Description of problems caused by drug(s)

B. Underlying health problems

(NOTE: Underlying health problems are important to theri effects on circulation time of a drug, utilization of a drug, dose of a drug, and type of drug ordered.)

1. Cardiovascular disease

   (NOTE: In patients with congestive heart failure, reduced cardiac output increases the circulation time of a drug. Renal failure can prolong the effect of digitalis preparations.)

2. Renal disease

   (NOTE: Many drugs are excreted by the kidneys. Reduced kidney function means that it will take longer for the drug to leave the body. Renal failure prolongs the effects of aminoglycoside antibiotics such as Gentamycin and produces further renal damage.)

3. Hepatic disease

   (NOTE: Many drugs are metabolized by the liver. Liver failure can prolong the effects of Tylenol and anticoagulants.)

4. Bleeding

   (NOTE: Anticoagulants are contraindicated if there is a history of recent ulcer.

INFORMATION SHEET

5. Respiratory disease

   (NOTE: Inderal is contraindicated if there is a history of asthma.)

C. Individual's present drug use and use pattern

   1. Names of all drugs now being taken, including over-the-counter drugs
   2. Prescribed drug schedule
   3. Personal drug schedule
   4. Understanding of therapeutic reason for prescribed drug(s)

IX. Methods of administering IV medications

A. Direct injection

   (NOTE: Direct injection is commonly termed *IV push.*)

   1. Injected, undiluted, by syringe into vein or IV tubing

      EXAMPLE: Lasix

   2. Injected, slightly diluted, by syringe into vein or IV tubing

      (NOTE: A powdered drug is reconstituted with the proper type and amount of diluent, dissolved in the vial until clear, and then drawn into a syringe and administered.)

      EXAMPLE: Keflin

   3. Used to administer a drug when it is pharmacologically inappropriate to retard the peak level of a drug

      EXAMPLE: Lasix

   4. Administered over a relatively short period of time

      EXAMPLE: One to twenty minutes

B. Intermittent infusion

   (NOTE: Intermittent infusion is commonly termed *IV piggyback.* This method is often written as IVPB on the doctor's orders.)

   1. Drug is added to a larger amount of solution

      (NOTE: A powdered drug is reconstituted with the proper type and amount of diluent in the vial until clear, then drawn into a syringe and added to a larger amount of solution. The final dilution can vary from 50 milliliters to 250 milliliters.)

      EXAMPLE: Kefzol

INFORMATION SHEET

2. Administered through an alternate IV administration set

   EXAMPLES: Secondary tubing into secondary port or back-check valve port; volume control device

3. Administered over a longer period of time than direct injection

   EXAMPLE: Fifteen minutes to several hours

C. Continuous infusion

1. Medication is added to a relatively large amount of solution

   EXAMPLE: Heparin to 1000 ml D_5W

   (NOTE: This amount of solution can vary from 250 milliliters to 1000 milliliters.)

2. Administered by adding to maintenance IV fluids

   EXAMPLE: KCl

3. Administration through an alternate IV site may be necessary

   (NOTE: Aminophylline and other incompatible drugs or solutions must be given through an alternate IV site or line.)

4. Administered continuously

5. Administration rate may require titration

   (NOTE: To titrate means to begin with a slow flow rate and increase until the desired effect is achieved. A drug that will require titration is the antihypertensive, Nipride.)

6. Administration order may be vague

   EXAMPLE: Heparin drip. Infuse 1000 units per hr.

   (NOTE: Dilution and flow rate are left to the nurse's discretion.)

   (CAUTION: Always double-check your calculations with another nurse.)

X. Administration guidelines for different methods of administering IV medications

A. Direct injection into IV tubing (IV push)

1. Inject small amount of drug

   (NOTE: Some drugs to be administered by IV push must be injected at or very near the insertion site. The IV tubing system will then require an injection port at or very near the insertion site.)

   EXAMPLE: Valium

INFORMATION SHEET

2. Observe patient for thirty seconds

   (NOTE: It takes approximately fifteen seconds for a medication injected into a peripheral vein to reach the heart and be pumped to the brain. This amount of time is dependent upon the patient's circulatory status.)

   (CAUTION: Observe for longer time, up to two minutes, if heart rate is very slow or blood pressure very low.)

3. Proceed with injection if no untoward reaction

   (CAUTION: Follow manufacturer's guidelines for total injection time.)

B. Direct injection into a vein without existing IV

1. Withdraw blood between administration of increments of a dose

   (CAUTION: Follow manufacturer's guidelines for total injection time.)

2. Divide doses into increments in separate syringes when titrating a dose for desired effect

   EXAMPLE: Valium for seizure control or hysterical reaction

   (NOTE: The dose can then be carefully controlled. When the drug is given from one syringe, it is diluted with blood; thus there is a loss of dose amount. The syringes can be changed on the needle as each dose increment is required.)

   (CAUTION: Use a non-Luer-Lok syringe, such as a tuberculin syringe, and carefully avoid touch contamination.)

C. Intermittent infusion

1. Determine correct amount of dilution

   (NOTE: The dilution recommended by manufacturer is a minimal safe dilution.)

2. Gently rotate or shake container after medication is added

   (CAUTION: The container must be labeled as soon as the medication is added.)

3. Increase dilution if necessary

   (NOTE: Carefully assess patient for possible fluid overload.)

INFORMATION SHEET

4. Decrease dilution if necessary

   (NOTE: Dilution is usually decreased because of CHF or renal failure. In both of these conditions there is a great risk of fluid overload with even minimal additional fluids.)

   (CAUTION: If dilution must be decreased, obtain guidelines from the pharmacy and a doctor's specific order.)

D. Continuous infusion

(CAUTION: The container must be labeled as soon as the medication is added.)

1. Gently rotate or shake container after medication is added

2. Piggyback a medication infusion into the secondary port of the primary solution tubing

   (NOTE: The primary IV solution and tubing can be left off until needed. This provides an alternate IV line and solution to keep the vein open if the medication drip has to be discontinued. Drugs that have to be piggybacked into a secondary port are heparin and aminophylline.)

3. Check carefully for incompatibilities

   EXAMPLE: Main IV solution with Solu-B-Forte added is incompatible with Keflin.

   (NOTE: If the main IV solution has a medication added and another medication must be given in the line, incompatibilities must be checked.)

   (CAUTION: Flush the tubing below the piggyback or push site both before and after an infusion or injection of medication if there is an incompatibility.)

4. Begin a second IV line or insert a heparin lock into a second IV site whenever necessary

   EXAMPLE: Aminophylline is incompatible with a great many other drugs and frequently requires a separate IV line and site.

5. Use infusion pump whenever possible for a medication infusion

   (NOTE: This provides much greater flow rate accuracy and helps prevent accidental overdose.)

   (CAUTION: When an infusion pump is not available, a microdrip tubing must be used to help prevent accidental overdose.)

INFORMATION SHEET

XI. Nursing responsibilities and interventions with regard to the administration of IV medications (Assignment Sheet #1)

(CAUTION: Once a drug has been injected or infused intravenously, it cannot be retrieved, and most of the time it cannot be neutralized or reversed.)

A. Follow closely all the "rights" when administering medications

B. Obtain or find where to obtain reference material for each medication with reference to dosage, routes, method or mode, length of infusion or injection, incompatibilities, effects, and side effects cr untoward reactions (Assignment Sheet #1)

(NOTE: Two reference books are highly recommended: *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management* by Diane Proctor Sager and Suzanne Kovarovic Bomar; and *Intravenous Medications: A Handbook for Nurses and Other Allied Health Personnel* by Betty L. Gahart.)

C. Obtain nursing history with emphasis on allergies

D. Choose appropriate syringe or IV tubing

E. Always tape any connections in IV line

F. Check insertion site before administration of medications

(NOTE: Check site for signs of infiltration and phlebitis.)

G. Observe patient for desired effects and any side effects or untoward reactions

H. Use strict aseptic technique throughout preparation and administration of medications

XII. Effects of drug incompatibilities

A. Undesired physiochemical reaction

EXAMPLE: Demerol added to Valium will cause the release of a gas.

B. Instability of drug

EXAMPLES: Stability destroyed by exposure to light, storage at improper temperature, diluent being added to powdered drugs

(NOTE: A drug is considered stable if at least 90 percent of its properties are effective until a specific time or date.)

(CAUTION: When a drug is in a colored or dark vial, it should be considered light-sensitive and protected from any lengthy exposure to strong, bright light.)

INFORMATION SHEET

C. Possible destruction of drug's therapeutic action

XIII. Types of drug incompatibilities

A. Physical incompatibility

1. Therapeutically ineffective action

EXAMPLE: Valium when combined in syringe with any other drug

2. Precipitation, color change, gas release (bubbles), or cloudiness

(NOTE: Color change occurs when a drug experiences an electron or hydrogen loss, or an oxygen increase.)

3. Inadequate solubilities or acid/base reactions

B. Chemical incompatibility

1. Therapeutically inactive drug

EXAMPLE: Gentamycin is inactivated if given within two hours of Geopen.

2. May not be visible

3. Irreversible breakdown of drug

XIV. Factors that affect compatibilities

A. Concentration of drug or drugs

1. The stronger the drug in solution, the quicker it can become incompatible or unstable

2. Multiple drugs in solution can become incompatible or unstable quickly

B. Length of contact time

1. The longer a drug is reconstituted, the greater the chance of it becoming incompatible or unstable

2. The longer a drug is in solution, the greater the chance of it becoming incompatible or unstable

(CAUTION: Prepare medications just before administration.)

C. Temperature of solution

1. High temperature promotes instability and incompatibility

INFORMATION SHEET

2. Low temperature provides stability and less chance of incompatibility

   (NOTE: Most powdered drugs have an expiration time after the diluent is added. Check to see if a reconstituted drug requires refrigeration for stability.)

D. pH level of mixture

1. Adding a diluent to a drug can change pH level

2. Adding a drug to a solution can change pH level

   EXAMPLES: Aqueous penicillin requires an acid solution; erythromycin requires a more alkaline solution.

   (CAUTION: Many drugs require either an acid or alkaline environment for stability.)

E. Light sensitivity

1. Exposure to light can result in degradation of some drugs

   EXAMPLES: Lasix, vitamin preparations

2. Colored vials or ampules are a clue to light sensitivity

   (NOTE: Some drugs, such as Nipride, come with foil to cover the solution after it is mixed.)

XV. Reason for using buffers with IV medications--To raise the pH of the IV solution before certain medications are added to the solution

(CAUTION: Because only certain medications require the increased pH, it is absolutely necessary that the nurse check the medication package inserts to determine if a buffer is required.)

XVI. Nursing responsibilities and interventions with regard to avoiding incompatibilities (Assignment Sheets #1 and #2)

A. Utilize all available resources to determine and avoid incompatibilities

   (NOTE: Highly recommended references are the Sager and the Gahart books listed in the bibliography.)

B. Always check medication package insert to determine whether a buffer is required

C. Always mix solutions well

D. Monitor for physical signs of incompatibilities

   EXAMPLES: Color change, cloudiness, crystals

   (CAUTION: Dilantin is compatible only with normal saline and will precipitate when in contact with any other solution or drug. Valium is compatible only with blood and will cloud when in contact with any other drug or solution.)

INFORMATION SHEET

E. Schedule drugs carefully (Assignment Sheet #2)

(NOTE: When scheduling multiple drugs, the possible incompatibilities must be considered and the drugs scheduled with sufficient time for complete infusion and clearance of tubing between drugs.)

XVII. Terms associated with untoward reactions

A. Angioneurotic edema--Condition characterized by development of local allergic hives accompanied by generalized swelling

(NOTE: This condition is benign and thought to be an allergic disorder.)

B. Anorexia--Lack of appetite

C. Antibody--Protein produced in the body in response to contact of the body with an antigen; neutralizes the antigen

D. Antigen--Substance that causes production of an antibody

E. Anuria--No urine output

F. Apnea--Absence of respirations

G. Bradycardia--Slow heart rate

H. Dyspnea--Difficult breathing

I. Extrasystoles--Premature beats that can originate anywhere in heart

J. Hematuria--Blood in urine

K. Hemolysis--Destruction of red blood cells

L. Ion--Electrically charged particle that can give off that charge when dissolved in water

M. Necrosis--Death of tissue

N. pH--Expression of acidity or alkalinity

O. Pruritus--Severe itching

P. Solubility--Capability of being dissolved

Q. Susceptible--Easily influenced by or affected with

R. Tachypnea--Rapid respirations

S. Tachycardia--Rapid heart rate

T. Threshold--Point at which a stimulus is just strong enough to be perceived

INFORMATION SHEET

U. Tolerance--Ability to endure or resist the effects of something

V. Tremors--Trembling; shaking

W. Urticaria--Vascular skin reaction characterized by hives and associated with severe itching

X. Ventricular fibrillation--Chaotic, uncoordinated quivering of heart

Y. Ventricular tachycardia--Very rapid heart rate in which the impulse causing the beating is coming from the ventricle

XVIII. Types of untoward reactions and/or side effects

A. Tolerance

1. Increasing amounts of drug are needed to produce desired effect

2. Usually occurs when a drug is given over a long period of time

3. Occurrence of cross tolerance can develop with chemically related drugs

(NOTE: If tolerance has developed to a narcotic such as Demerol, a cross tolerance to another narcotic such as Levo-dromoran may occur.)

B. Tachyphylaxis

1. Rapidly occurring tolerance; can occur after only a few doses

2. Tends to be associated with drugs that have a long duration of action

EXAMPLE: Digitoxin

C. Cumulation

1. Occurs when a drug is given at a faster rate than it can be metabolized and excreted

(NOTE: As each dose is given, more of the drug accumulates and a toxic effect will occur.)

2. Occurrence can be influenced by ongoing disease processes

(NOTE: These diseases are usually heart, liver, and renal in nature. Drugs that most frequently cause cumulation are narcotics and anticoagulants.)

D. Intolerance (hypersusceptibility)

1. Occurs when there is a greater response than normal

INFORMATION SHEET

2. Occurs when the threshold to normal action is lowered

   (NOTE: A drug that frequently causes intolerance is digoxin.)

E. Idiosyncrasy

1. Unpredictable response that is different from desired response

2. Occurrence not due to an allergy

   (NOTE: Idiosyncrasy often occurs with the class of drugs known as sedatives.)

F. Drug allergy (hypersensitivity)

1. Causes only a small percentage of untoward reactions

2. Occurrence requires a prior exposure with a lapse of ten to fourteen days

   (NOTE: This lapse is necessary for the antigen-antibody process to develop.)

3. Signs are skin reactions, fever, dyspnea, tightness in chest, nausea and/or vomiting, bronchospasms, laryngeal edema, and drop in blood pressure

4. Can lead to shock, circulatory collapse, and death

G. Overdose

1. Causes largest percentage of untoward reactions

2. Usually accidental

3. Occurrence can be due to a preexisting health problem

4. Frequently related to time and/or rate of injection

   EXAMPLES: 1. Aminophylline if given rapidly (one to two minutes) will have a high rate of reactions. If given over ten minutes, it will produce relatively slight reactions. If given over thirty minutes or as a continuous drip, it produces rare reactions.

   2. Valium if given rapidly will produce respiratory arrest.

XIX. Body systems affected by untoward reactions

A. Central nervous system

   (NOTE: Effects include stimulation, restlessness, tremors, convulsions, depression, drowsiness, slurred speech, and coma.)

INFORMATION SHEET

B. Blood vessels and vascular system

(NOTE: Effects include vasodilation with resulting hypotension and shock, vasoconstriction with resulting hypertension and possible cerebral vascular accident or peripheral necrosis.)

C. Cardiac

(NOTE: Effects include bradycardia, tachycardia, extrasystoles, ventricular tachycardia, and ventricular fibrillation.)

D. Pulmonary

(NOTE: Effects include dyspnea, tachypnea, apnea, acute asthmatic attack, and laryngospasms.)

E. Mucous membrane and skin

(NOTE: Effects include pruritis, urticaria and angioneurotic edema.)

F. Gastrointestinal

(NOTE: Effects include nausea and/or vomiting, anorexia, intestinal cramping, and diarrhea.)

G. Liver and hepatic system

(NOTE: Effects include acute hepatic necrosis and jaundice.)

H. Blood and blood-forming organs

(NOTE: Effects include hemolysis, bone marrow depression, and cellular malformation.)

I. Urinary tract

(NOTE: Effects include urine retention, anuria, and hematuria.)

XX. Nursing responsibilities and interventions with regard to untoward reactions

A. Monitor all body systems for signs of untoward reactions

(NOTE: Stay with the patient during the first five to fifteen minutes of the infusion of a drug.)

B. Know which drugs are more likely to cause life-threatening reactions

EXAMPLES: Penicillin and its derivatives, cephalosporins, Dilantin, and diagnostic dyes

C. Identify susceptible patients through a nursing history

INFORMATION SHEET

D. Avoid accidental dosage errors

E. Utilize resource material and follow guidelines for rate of injection/infusion

F. Enlist patient's help and cooperation

(NOTE: Instruct patient to call if experiencing any of the signs of an allergic reaction such as hives, itching, dyspnea, or swelling of the face.)

(CAUTION: Try not to alarm the patient.)

G. Stop infusion of drug *immediately* if allergic reaction is suspected

(NOTE: Change the main solution and tubing if medication is in the solution. Change the tubing if medication is by secondary set.)

(CAUTION: Keep the vein open. It may be your patient's only lifeline.)

H. Call for help and have another nurse stay with patient if any type of severe reaction occurs

I. Notify doctor immediately if allergic reaction is suspected

J. Monitor vital signs as indicated by type and seriousness of reaction

K. Reassure patient and family

L. Initiate resuscitation if reaction is catastrophic

M. Document your observations, actions, and any treatments initiated

XXI. Formula for calculation of drug doses (Transparency #1; Assignment Sheet #3)

(NOTE: X equals the unknown quantity desired.)

$$\frac{\text{Dosage on Hand}}{\text{Known Quantity of Drug on Hand}} = \frac{\text{Dosage Desired}}{\text{Unknown Quantity Desired (X)}}$$

EXAMPLE: Order is for 0.125 mg of digoxin. The dose that you have is 0.5 mg digoxin in 2 ml.

$$\frac{0.5 \text{ mg}}{2 \text{ ml}} = \frac{0.125 \text{ mg}}{X \text{ ml}}$$

Cross multiply (milligram amount of dosage on hand times X millimeter unknown quantity desired equals milliliter amount of known quantity of drug on hand times milligram dosage desired)

$$0.5 \text{ mg} \times X \text{ ml} = 2 \text{ ml} \times 0.125 \text{ mg}$$

$$0.5\,X = 0.250$$

$$X = 0.5 \text{ ml}$$ (Answer is milliliter quantity desired.)

Formula for Calculating Drug Doses

$$\frac{\text{Dosage on Hand}}{\text{Known Quantity of Drug on Hand}} = \frac{\text{Dosage Desired}}{\text{Unknown Quantity Desired (X)}}$$

EXAMPLE

You want 0.125 mg of digoxin.
The dose is 0.5 mg digoxin in 2 ml.

$$\frac{0.5}{2\text{ ml}} = \frac{0.125}{X\text{ ml}}$$

$$0.5X = 0.250$$

$$X = 0.5\text{ ml}$$

TM #1

IVT - 473

IV MEDICATIONS
UNIT XI

ASSIGNMENT SHEET #1--USE REFERENCE MATERIAL TO DETERMINE INCOMPATIBILITIES AND APPROPRIATE NURSING ACTIONS FOR IV ADMINISTRATION OF DRUGS

NAME ______________________ SCORE ____________

The ability to use reference material is an essential skill for an effective IV therapy team member. Reference material is available in many forms: reports, journals, articles, handbooks, books, and handouts received at professional meetings. It is important to check the date of any reference material; beware of materials with old dates. It is also important to maintain access to a library area with current holdings or to develop a personal library.

In this assignment you will be using reference material provided by your instructor and/or other available references to list incompatibilities of drugs used in IV therapy. You will also be listing appropriate nursing actions associated with use of specific drugs.

EXAMPLE: Diane Sager's book, *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management,* published in 1980, is a good reference.

A. List the incompatibilities for the following drugs. This exercise will help familiarize you with the use of reference material.

1. Adrenalin-- ______________________________

2. Aqueous penicillin-- ______________________________

3. Digoxin-- ______________________________

ASSIGNMENT SHEET #1

4. Garamycin-- ______________________________

5. Heparin-- ______________________________

6. Insulin-- ______________________________

7. Kefzol-- ______________________________

8. Lidocaine-- ______________________________

9. Morphine-- ______________________________

10. Potassium chloride-- ______________________________

ASSIGNMENT SHEET #1

B. List the appropriate nursing actions to observe when administering the following drugs by the IV route. Include method, dilution and/or diluent, length of infusion and/or injection, and precautions and/or cautions. Use reference material from your library or that supplied by your instructor.

1. Amiken (amikacin sulfate)--

2. Aminophylline--

3. Atropine (when used for a patient with a bradycardia and symptoms of low cardiac output)--

ASSIGNMENT SHEET #1

4. Dilantin--

5. Dopamine--

6. Erythromycin--

ASSIGNMENT SHEET #1

7. Lasix--

8. Mannitol--

ASSIGNMENT SHEET #1

9. Sodium bicarbonate--

10. Valium--

IV MEDICATIONS
UNIT XI

ASSIGNMENT SHEET #2--SCHEDULE THE ADMINISTRATION OF DRUGS

NAME ______________________________ SCORE ______________

The scheduling of drugs for administration by the nursing staff is the responsibility of the nurse noting the doctor's orders. This assignment sheet will give you practice in scheduling drugs before you must do it in the actual clinical setting.

PART I

Using the sample Medication Kardex below, schedule the following drugs for administration. Assume that all drugs are to be given to the same patient.

A. Ampicillin Gm ṫ q̄ 4 hr IVPB

B. Cleocin 600 mg IV q̄ 8 hr

C. Lanoxin 0.125 mg IV q̄ day

MEDICATION KARDEX

STARTING DATE	MEDICATION AND DOSE	ROUTE	ORDERED SCHEDULE	SCHEDULE	COMMENTS

ASSIGNMENT SHEET #2

PART II

Utilize available reference material to write the method, dilution, and length of infusion time for each of the drugs listed in Part I.

A. Ampicillin-- ______________________________

____

____

B. Cleocin-- ______________________________

____

____

C. Lanoxin-- ______________________________

____

____

IV MEDICATIONS
UNIT XI

ASSIGNMENT SHEET #3--CALCULATE DRUG DOSES AND DILUTIONS

NAME ______________________________ SCORE ______________

Every nurse needs constant practice in calculating drug doses. After you have completed this sheet, compare your calculations and answers with a partner. In real practice you will always want to double-check any calculations with another nurse.

PART I

Calculate the following drug doses and dilutions.

A. Doctor's order is for Demerol 35 mg. The dose you have on hand is 50 mg per ml. What milliliter amount would you give?

B. Doctor's order is for Aldomet 250 mg. The dose you have on hand is 50 mg per ml in a 5 ml multidose vial. How much would you give?

C. Order is for amikacin 375 mg tid. The dose you have on hand is 250 mg per ml in 2 ml vials. What milliliter amount would you draw up for each administration?

D. Order is for Apresoline 30 mg now. The dose you have on hand is 20 mg per ml in 1 ml ampules. How much would you give?

E. Order is for 0.4 mg of atropine. The dose you have on hand is 0.5 mg per ml in 1 ml ampule. How much would you give?

F. Order is for 5000 units of heparin. The dose you have on hand is 40,000 units per ml in a 1 ml vial. How much would you give?

ASSIGNMENT SHEET #3

G. Order is for Hyperstat in 75 mg bolus dose until BP is below 160 systolic. The dose you have on hand is 300 mg, 20 ml ampules of 15 mg per ml. How much would you give for each bolus?

H. Order is for Lasix 30 mg now. The dose you have on hand is 10 mg per ml in a 4 ml vial. How much would you give?

PART II

Write you interpretation of the following doctor's orders. This exercise will give you experience in interpretation and calculation of a doctor's rather difficult order.

A. Begin heparin drip. Infuse at a rate of 1000 units per hour. Add to D_5W.

B. Explain how you would calculate and mix the dilution.

C. Calculate a proper flow rate using a microdrip tubing, and state the rate to be set.

D. Calculate a proper flow rate using a volumetric infusion pump, and state the rate to be set.

IV MEDICATIONS
UNIT XI

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

A. 1. Sodium bicarbonate, Ionosol solutions, calcium-containing solutions

2. Vitamin C, tetracyclines, aminophylline, sodium bicarbonate, Vancomycin, cephalosporins, heparin, Lincocin, vitamins, aminoglycoside antibiotics

3. All other drugs

4. Geopen, cephalosporins, heparin, oxacillin, chloramphenicol, nafcillin, vitamin B complex

5. Garamycin, Pronestyl, Compazine, Benadryl, Sparine, narcotics, barbiturates, erythromycin, Keflin

6. Aminophylline, Dilantin, heparin, barbiturates, Diuril, Albamycin, penicillin, sulfadiazine

7. Calcium preparations, tetracyclines, erythromycin, kanamycin, ampicillins, barbiturates, amikacin

8. Sodium bicarbonate

9. Do not mix with any other drug; is incompatible with aminophylline, heparin, methicillin, sodium bicarbonate, Albamycin

10. Mannitol

B. 1. a. Give by intermittent infusion only

b. Dilute the ordered dose in at least 200 milliliters of D_5W

c. Infuse over sixty minutes

d. Do not mix with any other medication in any manner

e. Monitor hearing and renal status

f. Monitor intake and output

g. Monitor for overgrowth infection

2. a. Give by all three methods, but continuous infusion is preferred mode

ANSWERS TO ASSIGNMENT SHEETS

b. Inject or infuse at a rate not to exceed 25 milligrams per minute

c. Incompatible with many medications and may require a separate IV site and line

d. Use microdrip tubing or infusion pump

e. Observe for desired effect

f. Monitor for adverse reactions

g. Use the preparation labeled "for IV use *only*"

3. a. Give by IV push only

b. Give undiluted

c. Give rapidly

d. Monitor EKG continuously

e. Allow at least five minutes to achieve desired effect before second dose is given

f. Monitor for urinary retention

g. Do not give if patient has glaucoma

h. Monitor for side effects

i. Monitor for changes in mental status

4. a. Give by IV push only

b. Give undiluted

c. Give only with normal saline solution

d. Inject as close to the insertion site as possible

e. Clear tubing and/or catheter both before and after injection with sterile normal saline

f. Inject slowly at a rate not to exceed 50 milligrams per minute

g. Monitor blood pressure before and after injection

h. Ambulate with caution

i. Monitor respirations

j. Observe IV site for signs of phlebitis

ANSWERS TO ASSIGNMENT SHEETS

5. a. Infuse by continuous infusion only
   b. Add 400 milligrams to 250 milliliters D_5W, D_5NS, $D_51/2NS$, D_5RL
   c. Titrate for desired effect
   d. Always use microdrip tubing and piggyback into another IV line
   e. Monitor infusion rate carefully; use infusion pump if possible
   f. Monitor for desired effect; take blood pressure frequently
   g. Monitor urine output hourly
   h. Monitor EKG continuously
   i. Monitor IV site frequently for signs of infiltration
   j. Incompatible with many drugs and may require a separate IV site and line
   k. Hypovolemia must be corrected before this drug is used
   l. Monitor for changes in circulation of extremities

6. a. Give by intermittent infusion or continuous infusion
   b. Reconstitute powder only with sterile water *without* bacteriostat
   c. Add 10 milliliters to the 500 milligram vial and 20 milliliters to the 1 gram vial
   d. Dilute ordered dose to 100 to 250 milliliters of NS for intermittent infusion
   e. Add the ordered dose to 1000 milliliters of solution for continuous infusion
   f. Infuse the intermittent infusion over one to two hours
   g. Solution must be completed within four hours
   h. Infuse continuous infusion according to dose and fluid volume
   i. If infusion is to infuse longer than four hours, the solution must be buffered to a pH of 7
   j. If using solution other than normal saline, the buffer must be added first
   k. Any solution must be infused within eight hours

ANSWERS TO ASSIGNMENT SHEETS

7. a. Give by IV push only
   b. Inject undiluted
   c. Inject over a period of one to two minutes
   d. Monitor urine output
   e. Monitor for electrolyte imbalance
   f. Monitor blood pressure
   g. Do not mix with any other drug in syringe or tubing

8. a. Give by all three methods
   b. Inject or infuse undiluted
   c. Inject over three to five minutes
   d. Intermittent infusion rate will usually be specifically ordered; usual time is thirty to sixty minutes
   e. Continuous infusion rate is titrated for desired effect
   f. Use filter needle if possible when giving by direct injection
   g. Use a filter when giving by IV piggyback or continuous infusion
   h. Monitor urine output hourly
   i. Monitor blood pressure, pulse, and respirations hourly
   j. Monitor electrolytes
   k. Avoid infiltration
   l. Incompatible with KCl
   m. Monitor for signs of pulmonary edema

9. a. Give by all three methods
   b. Dilute in 500 milliters of compatible solution for intermittent infusion
   c. Intermittent infusion rate is titrated to blood gases
   d. Dilute in daily maintenance IV fluids for continuous infusion
   e. Continuous infusion dosage is titrated to blood gases

ANSWERS TO ASSIGNMENT SHEETS

f. Give undiluted IV push

g. Give by rapid IV push

h. Incompatible with many drugs and solutions

i. Monitor for sodium retention

j. Maintain adequate ventilation

10. a. Give by IV push *only*

b. Inject undiluted

c. Inject at a rate not to exceed five milligrams per minute

d. Inject into vein or tubing as close to insertion site as possible

e. Flush tubing and needle with normal saline after injection

f. Monitor respirations frequently

g. Be prepared to support respirations

h. Monitor blood pressure frequently

i. Keep patient in bed with rails up for two hours after injection

j. Ambulate with caution

k. Check for urinary retention

l. Monitor for increase in psychiatric symptoms

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #2

PART I--Evaluated to the satisfaction of the instructor

Sample schedule

MEDICATION KARDEX

STARTING DATE	MEDICATION AND DOSE	ROUTE	ORDERED SCHEDULE	SCHEDULE	COMMENTS
10/30/81	Ampicillin Gm ṫ	IVPB	q̄ 4 hr	10A-2P-6P 10P-2A-6A	
10/30/81	Cleocin 600 mg	IV	q̄ 8 hr	12P-8P-4A	Give in at least 100 ml over 60 minutes
10/30/81	Lanoxin 0.125 mg	IV	q̄ day	9A	Check apical pulse before giving

PART II

A. Ampicillin

1. Intermittent infusion
2. Dilute each 500 milligrams in 50 to 100 milliliters of D_5W, NS or LR
3. Infuse over thirty minutes

B. Cleocin

1. Intermittent infusion
2. Dilute in 100 milliliters of any solution
3. Infuse over sixty minutes

C. Lanoxin

1. IV push only
2. Undiluted
3. Inject over at least one minute

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #3

PART I

A. 0.7 ml

B. 5 ml

C. 1.5 ml

D. 1.5 ml

E. 0.8 ml

F. 0.125 ml

G. 5 ml

H. 3 ml

PART II

A. Start a continuous heparin infusion. Add a dosage of heparin to an amount of D_5W to make a final dilution to give 1000 units an hour

B. 1. Since doctor has prescribed 1000 units per hour, it is best to use like numbers--for instance 1000 ml of solution

1000 units heparin per X ml of solution per hour to equal 1000 units per hour

2. Choose a flow rate per hour appropriate to the patient's condition--100 ml per hour

1000 units heparin per 100 ml solution per hour to equal 1000 units per hour

3. Determine how many 100 ml increments are in the 1000 ml of solution

$$\begin{array}{r} 10 \\ 100\overline{)1000} \end{array}$$

4. Add 1000 units of heparin for every 100 ml of solution. The plan in step 2 was to infuse 100 ml per hour so that every 100 ml will deliver 1000 units per hour

5. There were 10 increments of 100 ml per 1000; add 1000 units for each increment $1000 \times 10 = 10{,}000$

6. Add 10,000 units to the 1000 ml D_5W

C. $\frac{60}{60} \times \frac{100}{1} = \frac{6000}{600} = \frac{100}{1} =$ 100 drops per minute

D. Simply set the pump at the prescribed per hour flow rate--100 ml per hour

IV MEDICATIONS
UNIT XI

TEST

NAME ______________________ SCORE ______________

1. Match terms associated with IV medications to their correct definitions. Write the correct numbers in the blanks.

_____ a. To lessen the pain or severity without curing

_____ b. Rapid IV push

_____ c. Serving to cure or heal

_____ d. Having the power to cure

_____ e. To thin down by mixing with another liquid

_____ f. Anything written to record or prove something

_____ g. Condition in which the heart does not pump effectively

_____ h. To change and then utilize substances entering the body

_____ i. Way of doing something

_____ j. Method

_____ k. Separating out from a solvent

_____ l. Chemical change

_____ m. To restore or reconstruct by adding a substance

_____ n. Course; path; way

_____ o. Strength or density of a solution

_____ p. To change flow rate to achieve a desired effect

_____ q. Unfortunate; unfavorable

_____ r. Degree of reaction to stimuli

1. Mode
2. Route
3. Method
4. Reaction
5. Palliative
6. Sensitivity
7. Metabolize
8. Dilute
9. Reconstitute
10. Titrate
11. Curative
12. Untoward
13. Therapeutic
14. Precipitation
15. Concentration
16. Document
17. Bolus
18. Congestive heart failure (CHF)

TEST

2. Match abbreviations associated with IV medications to their correct terms. Write the correct numbers in the blanks.

_____a. Orally; per os

_____b. Intravenous

_____c. Milliliter

_____d. Intramuscular

_____e. Subcutaneous

1. IM
2. SQ
3. PO
4. IV
5. ml

3. Distinguish among ways drugs are used. Write the correct numbers in the blanks. Numbers may be used more than once.

_____a. Preventing complications before surgery or after illness, injury, or surgery

_____b. Replacement

_____c. Determining if there is an ongoing disease process in an organ or organ system

_____d. Curative

_____e. Preventing communicable diseases

_____f. Palliative

_____g. Determining function of an organ or organ system

_____h. Supportive

1. Diagnostic
2. Prophylactic
3. Therapeutic

4. State the five "rights" of administering medications.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

5. State three additional "rights" of administering IV medications.

a. ______________________________

b. ______________________________

c. ______________________________

TEST

6. List facts to determine about an IV medication before administration.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

7. Select from the following list safety measures to observe when administering an IV medication. Write an "X" in the blank before each correct answer.

_____ a. Read medication label three times

_____ b. Prepare medications as early as possible

_____ c. Give only medications that you prepare, or medications prepared by pharmacy

_____ d. Give medication if it is in patient's drawer but not labeled

_____ e. Administer medication immediately upon removal from refrigerator

_____ f. Check medication communication tool with patients Kardex before preparing medications

_____ g. Double-check any dose calculation with another nurse

_____ h. Remain with patient until a direct injection is completed

_____ i. Prepare medications for administration by next shift

_____ j. Never give a medication without a doctor's order

_____ k. When called away, leave the medication tray at nurses' station

_____ l. Identify patient before administering a medication

_____ m. Do not talk during preparation

_____ n. Obtain nursing history with emphasis on drug allergies

_____ o. Obtain shift report from previous nurse while preparing the medications

_____ p. Never leave a tray of medication unattended

_____ q. Never give medication from an unlabeled or illegibly labeled container

TEST

______ r. Always check IV needle or catheter and vein for patency before administering a medication

______ s. Label an intermittent or continuous infusion container as soon as medication is added

8. List medication information to be obtained in a nursing history.

   a. Drug allergies or sensitivities

      1) ______________________________

      2) ______________________________

      3) ______________________________

   b. Underlying health problems

      1) ______________________________

      2) ______________________________

      3) ______________________________

      4) ______________________________

      5) ______________________________

   c. Individual's present drug use and use pattern

      1) ______________________________

      2) ______________________________

      3) ______________________________

      4) ______________________________

9. Distinguish among methods of administering IV medications. Write the correct numbers in the blanks. Numbers may be used more than once.

______ a. Administered by adding to maintenance IV fluids

______ b. Drug is added to a larger amount of solution

______ c. Used to administer a drug when it is pharmacologically inappropriate to retard the peak level of a drug

______ d. Administration through an alternate IV site may be necessary

______ e. Injected, undiluted, by syringe into vein or IV tubing

1. Direct injection
2. Intermittent infusion
3. Continuous infusion

TEST

_____ f. Administration rate may require titration

_____ g. Administered over a relatively short period of time

_____ h. Medication is added to a relatively large amount of solution

_____ i. Administered continuously

_____ j. Administered over a longer period of time than direct injection

_____ k. Injected, slightly diluted, by syringe into vein or IV tubing

_____ l. Administration order may be vague

_____ m. Administered through an alternate IV administration set

10. Match methods of administering IV medications to their correct administration guidelines. Write the correct numbers in the blanks.

_____ a. Inject small amount of drug; observe patient for thirty seconds; proceed with injection if no untoward reaction

_____ b. Gently rotate or shake container after medication is added; piggyback a medication infusion into the secondary port of the primary solution tubing; check carefully for incompatibilities; begin a second IV line or insert a heparin lock into a second IV site whenever necessary; use infusion pump whenever possible for a medication infusion

_____ c. Withdraw blood between administration of increments of a dose; divide doses into increments in separate syringes when titrating a dose for desired effect

_____ d. Determine correct amount of dilution; gently rotate or shake container after medication is added; increase dilution if necessary; decrease dilution if necessary

1. Direct injection into IV tubing (IV push)
2. Direct injection into a vein without existing IV
3. Intermittent infusion
4. Continuous infusion

TEST

11. State nursing responsibilities and interventions with regard to the administration of IV medications.

    a. ______________________________

    b. ______________________________

    c. ______________________________

    d. ______________________________

    e. ______________________________

    f. ______________________________

    g. ______________________________

    h. ______________________________

12. List the effects of drug incompatibilities.

    a. ______________________________

    b. ______________________________

    c. ______________________________

13. Describe types of drug incompatibilities.

    a. Physical incompatibility--______________________________

    b. Chemical incompatibility--______________________________

14. Discuss factors that affect compatabilities.

    a. Concentration of drug or drugs--______________________________

TEST

b. Length of contact time--

c. Temperature of solution--

d. pH level of mixture--

e. Light sensitivity--

15. State reason for using buffers with IV medications.

16. State nursing responsibilities and interventions with regard to avoiding incompatibilities.

a.

b.

c.

d.

e.

TEST

17. Match to their correct definitions terms associated with untoward reactions. Write the correct numbers in the blanks. Terms and definitions are continued on the next page.

_____ a. Absence of respirations

_____ b. Lack of appetite

_____ c. Slow heart rate

_____ d. Substance that causes production of an antibody

_____ e. No urine output

_____ f. Protein produced in the body in response to contact of the body with an antigen; neutralizes the antigen

_____ g. Condition characterized by development of local allergic hives accompanied by generalized swelling

_____ h. Difficult breathing

_____ i. Premature beats that can originate anywhere in heart

_____ j. Trembling; shaking

_____ k. Destruction of red blood cells

_____ l. Electrically charged particle that can give off that charge when dissolved in water

_____ m. Death of tissue

_____ n. Expression of acidity or alkalinity

_____ o. Very rapid heart rate in which the impulse causing the beating is coming from the ventricle

_____ p. Capability of being dissolved

_____ q. Easily influenced by or affected with

_____ r. Rapid respirations

_____ s. Rapid heart rate

_____ t. Point at which a stimulus is just strong enough to be perceived

1. Solubility
2. Tremors
3. Necrosis
4. Bradycardia
5. Antigen
6. Tachypnea
7. Extrasystoles
8. Tachycardia
9. Antibody
10. Anorexia
11. Ventricular tachycardia
12. Apnea
13. Threshold
14. Angioneurotic edema
15. Hemolysis
16. Anuria
17. Susceptible
18. Ion
19. pH
20. Dyspnea

TEST

_____u. Ability to endure or resist the effects of something

_____v. Blood in urine

_____w. Vascular skin reaction characterized by hives and associated with severe itching

_____x. Chaotic, uncoordinated quivering of heart

_____y. Severe itching

21. Hematuria
22. Tolerance
23. Urticaria
24. Ventricular fibrillation
25. Pruritus

18. Match to their correct descriptions types of untoward reactions and/or side effects. Write the correct numbers in the blanks. Numbers may be used more than once.

_____a. Tends to be associated with drugs that have a long duration of action

_____b. Frequently related to time and/or rate of injection

_____c. Increasing amounts of drug are needed to produce desired effect

_____d. Unpredictable response that is different from desired response

_____e. Occurrence can be influenced by ongoing disease processes

_____f. Causes largest percentage of untoward reactions

_____g. Occurrence of cross tolerance can develop with chemically related drugs

_____h. Occurrence not due to an allergy

_____i. Causes only a small percentage of untoward reactions

_____j. Usually occurs when a drug is given over a long period of time

_____k. Usually accidental

_____l. Occurs when there is a greater response than normal

_____m. Rapidly occurring tolerance; can occur after only a few doses

1. Tolerance
2. Tachyphylaxis
3. Cumulation
4. Intolerance (hypersusceptibility)
5. Idiosyncrasy
6. Drug allergy (hypersusceptibility)
7. Overdose

TEST

_____n. Occurrence requires a prior exposure with a lapse of ten to fourteen days

_____o. Occurs when a drug is given at a faster rate than it can be metabolized and excreted

_____p. Can lead to shock, circulatory collapse, and death

_____q. Occurrence can be due to a preexisting health problem

_____r. Occurs when the threshold to normal action is lowered

_____s. Signs are skin reactions, fever, dyspnea, tightness in chest, nausea and/or vomiting, bronchospasms, laryngeal edema, and drop in blood pressure

19. Name the body systems affected by untoward reactions.

a. ____

b. ____

c. ____

d. ____

e. ____

f. ____

g. ____

h. ____

i. ____

20. Select from the following list nursing responsibilities and interventions with regard to untoward reactions. Write an "X" in the blank before each correct answer.

_____a. Do not frighten patient by explaining possible side effects

_____b. Notify doctor immediately if allergic reaction is suspected

_____c. Monitor vital signs as indicated by type and seriousness of reaction

_____d. Continue infusion until doctor is notified and reaction is confirmed

_____e. Monitor urine output hourly

TEST

_____f. Monitor all body systems for signs of untoward reactions

_____g. Enlist patient's help and cooperation

_____h. Monitor vital signs every fifteen minutes during first infusion of a drug

_____i. Stop infusion of drug *immediately* if allergic reaction is suspected

_____j. Avoidance of accidental overdose is almost impossible

_____k. Know which drugs are more likely to cause life-threatening reactions

_____l. Call for help and have another nurse stay with patient if any type of severe reaction occurs

_____m. Know that drug reactions occur infrequently

_____n. Identify susceptible patients through a nursing history

_____o. Reassure patient and family

_____p. Avoid accidental dosage errors

_____q. Injection or infusion time is not very important; drugs can be given quickly when floor is busy

_____r. Document your observations, actions, and any treatments initiated

_____s. Utilize resource material and follow guidelines for rate of injection/ infusion

_____t. Initiate resuscitation if reaction is catastrophic

21. State the formula for calculation of drug doses.

____

____

(NOTE: Test questions 22-24 list the assignment sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

22. Use reference material to determine incompatibilities and appropriate nursing actions for IV administration of drugs.

23. Schedule the administration of drugs.

24. Calculate drug doses and dilutions.

IV MEDICATIONS
UNIT XI

ANSWERS TO TEST

1. a. 5
   b. 17
   c. 13
   d. 11
   e. 8
   f. 16
   g. 18
   h. 7
   i. 3
   j. 1
   k. 14
   l. 4
   m. 9
   n. 2
   o. 15
   p. 10
   q. 12
   r. 6

2. a. 3
   b. 4
   c. 5
   d. 1
   e. 2

3. a. 2
   b. 3
   c. 1
   d. 3
   e. 2
   f. 3
   g. 1
   h. 3

4. a. Right medication
   b. Right dose
   c. Right route (method)
   d. Right time
   e. Right patient

5. a. Method or mode
   b. Length of injection or infusion time
   c. Check for incompatibilities

ANSWERS TO TEST

6. a. Average dose
   b. Route of administration
   c. Length of time of injection or infusion
   d. Expected action (effect)
   e. Common untoward reactions (side effects)
   f. Incompatibilities

7. a, c, f, g, h, j, l, m, n, p, q, r, s.

8. a. Drug allergies or sensitivities
      1) Previous problems with any drug(s)
      2) Previous problems with specific drug(s) to be administered
      3) Description of problems caused by drug(s)
   b. Underlying health problems
      1) Cardiovascular disease
      2) Renal disease
      3) Hepatic disease
      4) Bleeding
      5) Respiratory disease
   c. Individual's present drug use and use pattern
      1) Names of all drugs now being taken, including over-the-counter drugs
      2) Prescribed drug schedule
      3) Personal drug schedule
      4) Understanding of therapeutic reason for prescribed drug(s)

9. a. 3
   b. 2
   c. 1
   d. 3
   e. 1
   f. 3
   g. 1
   h. 3
   i. 3
   j. 2
   k. 1
   l. 3
   m. 2

ANSWERS TO TEST

10. a. 1

b. 4

c. 2

d. 3

11. a. Follow closely all the "rights" when administering medications

b. Obtain or find where to obtain reference material for each medication with reference to dosage, routes, method or mode, length of infusion or injection, incompatibilities, effects, and side effects or untoward reactions

c. Obtain nursing history with emphasis on allergies

d. Choose appropriate syringe or IV tubing

e. Always tape any connections in IV line

f. Check insertion site before administration of medications

g. Observe patient for desired effects and any side effects or untoward reactions

h. Use strict aseptic technique throughout preparation and administration of medications

12. a. Undesired physiochemical reaction

b. Instability of drug

c. Possible destruction of drug's therapeutic action

13. Description should include the following

a. Physical incompatibility

1) Therapeutically ineffective action

2) Precipitation, color change, gas release (bubbles), or cloudiness

3) Inadequate solubilities or acid/base reactions

b. Chemical incompatibility

1) Therapeutically inactive drug

2) May not be visible

3) Irreversible breakdown of drug

ANSWERS TO TEST

14. Discussion should include the following
    - a. Concentration of drug or drugs
        1. The stronger the drug in solution, the quicker it can become incompatible or unstable
        2. Multiple drugs in solution can become incompatible or unstable quickly
    - b. Length of contact time
        1. The longer a drug is reconstituted, the greater the chance of it becoming incompatible or unstable
        2. The longer a drug is in solution, the greater the chance of it becoming incompatible or unstable
    - c. Temperature of solution
        1. High temperature promotes instability and incompatibility
        2. Low temperature provides stability and less chance of incompatibility
    - d. pH level of mixture
        1. Adding a diluent to a drug can change pH level
        2. Adding a drug to a solution can change pH level
    - e. Light sensitivity
        1. Exposure to light can result in degradation of some drugs
        2. Colored vials or ampules are a clue to light sensitivity

15. Reason for using buffers with IV medications--To raise the pH of the IV solution before certain medications are added to the solution

16. a. Utilize all available resources to determine and avoid incompatibilities
    - b. Always check medication package insert to determine whether a buffer is required
    - c. Always mix solutions well
    - d. Monitor for physical signs of incompatibilities
    - e. Schedule drugs carefully

ANSWERS TO TEST

17. a. 12
b. 10
c. 4
d. 5
e. 16
f. 9
g. 14
h. 20
i. 7
j. 2
k. 15
l. 18
m. 3
n. 19
o. 11
p. 1
q. 17
r. 6
s. 8
t. 13
u. 22
v. 21
w. 23
x. 24
y. 25

18. a 2
b. 7
c. 1
d. 5
e. 3
f. 7
g. 1
h. 5
i. 6
j. 1
k. 7
l. 4
m. 2
n. 6
o. 3
p. 6
q. 7
r. 4
s. 6

19. a. Central nervous system
b. Blood vessels and vascular system
c. Cardiac
d. Pulmonary
e. Mucous membrane and skin

ANSWERS TO TEST

f. Gastrointestinal

g. Liver and hepatic system

h. Blood and blood-forming organs

i. Urinary tract

20. b, c, f, g, i, k, l, n, o, p, r, s, t

21. $$\frac{\text{Dosage on Hand}}{\text{Known Quantity of Drug on Hand}} = \frac{\text{Dosage Desired}}{\text{Unknown Quantity Desired (X)}}$$

22. Evaluated to the satisfaction of the instructor

23. Evaluated to the satisfaction of the instructor

24. Evaluated to the satisfaction of the instructor

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

UNIT OBJECTIVE

After completing this unit, the student should be able to administer blood, blood products, and volume expanders in a safe and accurate manner. The student should also be able to identify the signs and symptoms of the hazards of transfusions, and be able to intervene quickly and appropriately. This knowledge will be shown by completing assignment sheets, job sheets and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match to their correct definitions terms associated with blood and blood products.
2. Write abbreviations for key words used with blood, blood products, and volume expanders.
3. Select from a list functions of blood.
4. List the components of blood.
5. State information related to blood and blood products.
6. Distinguish among infusion guidelines for blood and blood products.
7. Arrange in order steps to follow for infusion of blood and blood products.
8. Match to their correct definitions terms associated with hazards of transfusing blood and blood products.
9. Identify hazards associated with blood and blood product transfusions.
10. Match specific hazards of transfusing blood and blood products to correct nursing responsibilities and interventions.
11. Describe volume expanders and their actions.
12. Distinguish among characteristics of each of the two types of biologic volume expanders.
13. Describe how synthetic volume expanders differ from biologic volume expanders.
14. Select from a list nursing responsibilities and interventions with regard to volume expanders.

OBJECTIVE SHEET

15. Fill out requisitition forms associated with blood and blood products.

16. Calculate flow rates for blood and blood products.

17. Fill out form for reporting a suspected transfusion reaction.

18. Demonstrate the ability to

    a. Fill straight-line blood tubing.

    b. Fill Y-type blood tubing.

    c. Fill Y-type blood tubing containing built-in pump.

    d. Fill microaggregate filter.

    e. Obtain unit of blood from blood bank.

    f. Obtain unit of white blood cells, plasma, or platelets from blood bank.

    g. Identify unit of blood with patient.

    h. Identify unit of white blood cells, plasma, or platelets with patient.

    i. Transfuse whole blood or packed red cells.

    j. Transfuse white blood cells.

    k. Transfuse plasma.

    l. Transfuse platelets.

    m. Administer plasma protein fraction or albumin.

    n. Administer clotting factors 8 and 9.

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

SUGGESTED ACTIVITIES

I. Suggested activities

A. Order materials to supplement unit.

1. *Management of Blood Transfusions.* Color, 35 mm filmstrip and audio cassette, 30 minutes, Program #PC 174, Trainex Corp., 1970. Available from Trainex Corp., 12601 Industry Street, Garden Grove, California 92641.

2. *Hypovolemic Shock.* Color, 35 mm filmstrip and audio cassette, 30 minutes, Program #PC 218, Trainex Corp., 1971. Available from Trainex Corp., 12601 Industry Street, Garden Grove, California 92641.

3. Obtain or have the students obtain samples of the requisition forms used for blood and blood products from a local area hospital (Assignment Sheet #1).

B. Order equipment to supplement unit.

1. One straight-line blood tubing for each student

2. One Y-type blood tubing for each student

3. One Y-type blood tubing with built-in pump for each student

   (NOTE: Only when used for artificial arms may these tubings be emptied and reused. Be sure to save packaging and protective caps.)

4. One microaggregate filter for each student (Job Sheet #4)

   (NOTE: These filters are expensive and the cost may prohibit use.)

5. At least two or three solution containers of any type for each student

   (NOTE: Only after use with artificial arms may these containers can be reused.)

   (CAUTION: For use on artificial arms, empty the IV container of the IV solution, rinse, and refill with distilled water.)

6. All equipment listed in suggested activities in Unit VI, "Equipment and Supplies," if you choose to have students practice the whole venipuncture process again

SUGGESTED ACTIVITIES

C. Pretest students to assess their present knowledge of the subject.

D. Provide students with objective sheet.

E. Provide students with information, assignment, and job sheets.

F. Discuss unit and specific objectives.

G. Discuss information sheet.

H. Individualize instruction for students with special needs.

I. Discuss how to obtain a unit of blood from blood bank and the items to be checked. Use Job Sheets #5 through #8.

J. Show examples of each type blood tubing as discussed.

K. Show examples of types of requisition forms as discussed.

L. Discuss assignment sheets.

M. Lay out equipment for ease of use.

N. Set up arms if being used.

O. Invite a blood bank technician to speak on blood and blood products.

P. Demonstrate and discuss procedures outlined in job sheets.

(NOTE: Some of the job sheets will have to be discussed theoretically as they can only be literally demonstrated in the actual clinical setting. This is indicated on the job sheet.)

Q. Give test.

R. Discuss test.

S. Reteach if necessary.

II. Instructional materials

A. Objective sheet

B. Suggested activities

C. Information sheet

SUGGESTED ACTIVITIES

D. Assignment sheets

  1. Assignment Sheet #1--Fill Out Requisition Forms Associated with Blood and Blood Products
  2. Assignment Sheet #2--Calculate Flow Rates for Blood and Blood Products
  3. Assignment Sheet #3--Fill Out Form for Reporting a Suspected Transfusion Reaction
  4. Assignment Sheet #4--Complete Blood and Blood Products Crossword Puzzles

E. Answers to assignment sheets

F. Job sheets

  1. Job Sheet #1--Fill Straight-Line Blood Tubing
  2. Job Sheet #2--Fill Y-Type Blood Tubing
  3. Job Sheet #3--Fill Y-Type Blood Tubing Containing Built-In Pump
  4. Job Sheet #4--Fill Microaggregate Filter
  5. Job Sheet #5--Obtain Unit of Blood from Blood Bank
  6. Job Sheet #6--Obtain Unit of White Blood Cells, Plasma, or Platelets from Blood Bank
  7. Job Sheet #7--Identify Unit of Blood with Patient
  8. Job Sheet #8--Identify Unit of White Blood Cells, Plasma, or Platelets with Patient
  9. Job Sheet #9--Transfuse Whole Blood or Packed Red Cells
  10. Job Sheet #10--Transfuse White Blood Cells
  11. Job Sheet #11--Transfuse Plasma
  12. Job Sheet #12--Transfuse Platelets
  13. Job Sheet #13--Administer Plasma Protein Fraction or Albumin
  14. Job Sheet #14--Administer Clotting Factors 8 and 9

G. Test

H. Answers to test

SUGGESTED ACTIVITIES

III. Unit references

A. Buickus, Barbara A. "Blood Therapy: Administering Blood Components." *American Journal of Nursing,* Vol. 79, No. 5 (May, 1979), pp. 937-938.

B. Dressler, Diane. "Understanding and Treating Hemophilia." *Nursing80,* Vol. 10, No. 8 (August, 1980), pp. 72-73.

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D. Hernandez, Bernadita. "Platelets: A Short Course." *RN,* Vol. 43, No. 6 (June, 1980), pp. 36-41.

E. Plumer, Ada L. *Principles and Practices of IV Therapy,* 2nd ed. Boston: Little, Brown & Co., 1970.

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H. Thomas, Clayton L., ed. *Taber's Cyclopedic Medical Dictionary,* 14th ed. Philadelphia: F. A. Davis Co., 1981.

I. West Richard Samuel, ed. *Managing IV Therapy,* Photobook Series. Horsham, Pennsylvania: Intermed Communications, Inc., 1980.

IV. Additional reading--Summer, Sara M., and Pamela A. Grau. "To Defeat Hypovolemic Shock, Anticipate and Act Swiftly." *Nursing81,* Vol. 11, No. 10 (October, 1981), pp. 46-51.

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

INFORMATION SHEET

I. Terms and definitions associated with blood and blood products (Assignment Sheet #4)

   A. Agitate--Movement of a container so that the contents are mixed

   B. Assessment--Evaluation

   C. Colloid--Gelatinous substance made of insoluble particles larger than molecules but small enough to remain suspended in a fluid

   D. Fibrinolysis--Disintegration of fibrin, the protein that promotes clotting

   E. Granulocytopenia--Abnormal reduction of one type of white blood cells

   F. Hemolysis--Disintegration and destruction of red blood cells

   G. Hemostatic--Capable of stopping the flow of blood

   H. Hypoproteinemia--Low body protein

   I. Hypovolemia--Low circulating volume of fluid

   J. Lyophilize--To rapidly freeze a substance at an extremely low temperature and then dehydrate that substance in a vacuum

   K. Osmosis--Tendency of fluids to pass through a semipermeable membrane to equalize concentrations on both sides of the membrane

   L. Platelet--Small roundish disc found in blood and associated with blood clotting

   M. Restoration--Act of bringing back to a former or normal state

   N. Sediment--Any matter that settles to the bottom of a liquid

   O. Suspend--To hold or keep particles in a liquid in suspension; to hang

   P. Synthesis--Combination of parts to make a whole

II. Abbreviations for key words used with blood, blood products, and volume expanders (Assignment Sheet #4)

   A. BP--Blood pressure

   B. CO_2--Carbon dioxide

   C. Hct--Hematocrit

INFORMATION SHEET

D. Hgb--Hemoglobin

E. HLA--Human leukocyte group A antigen

F. IgA--Immunoglobulin gamma A

G. P--Pulse

H. R--Respirations

I. T--Temperature

J. VS--Vital signs

K. RBC--Red blood cells

L. WBC--White blood cells

M. ABO--Letters denoting blood group types

III. Functions of blood

A. Carries essentials for tissue synthesis and energy

B. Removes waste products from cells

C. Supplies oxygen and nutrients for tissue maintenance, growth, and repair

D. Transports cellular wastes to elimination organs

EXAMPLE: CO_2 to lungs

(NOTE: The main elimination organs are the liver, kidneys, and lungs.)

E. Provides a defense against infection

(NOTE: Blood transports antibodies and white cells.)

F. Helps regulate and equalize body temperature

G. Helps maintain tissue acid/base balance

H. Helps regulate body fluids and electrolyte content

I. Maintains clotting factors

IV. Components of blood

A. Red blood cells

B. White blood cells

INFORMATION SHEET

C. Plasma

D. Platelets

E. Proteins

F. Albumin

G. Clotting factors

INFORMATION SHEET

V. Information related to blood and blood products

Blood/Blood Product	Use(s)	Volume	Typing/ Crossmatching	Filter	Storage
Whole blood (NOTE: Whole blood contains all blood components.)	Restoring adequate volume EXAMPLES: Hemorrhage, trauma, burns, surgery (NOTE: It is not recommended to use whole blood if a specific component can be given.)	500 milliliters per unit	Yes	Yes (NOTE: A blood administration set includes a filter.)	Up to twenty-one days at 41°F (NOTE: The longer that blood is stored, the more likely there will be a build-up of potassium and ammonia, which is caused by the deterioration and destruction of red blood cells.)
Red blood cells (NOTE: This component is whole blood with 80 percent of the plasma removed.)	Replacing RBCs when volume does not need to be restored EXAMPLES: Organ transplants, leukemia, open-heart sugrery, anemias (NOTE: Red blood cells carry oxygen to the tissues. Any significant deficiency can mean a lowered amount of oxygen available to the cells.)	250 to 300 milliliters per unit (varies with amount of plasma removed)	Yes	Yes (NOTE: A blood administration set includes a filter.)	Up to twenty-one days at 41°F (NOTE: The use of RBCs avoids possible infusion of excess potassium and ammonia because most of the plasma has been removed.)
White blood cells (NOTE: This component is whole blood with all red cells and 80 percent of the plasma removed.)	Treating life-threatening granulocytopenia (NOTE: Granulocytopenia is usually caused by extensive chemotherapy.)	150 to 250 milliliters per unit	ABO typing (NOTE: WBCs should also be HLA compatible.)	Yes	Usable *only* for twenty-four hours after collection if refrigerated

INFORMATION SHEET

Blood/Blood Product	Use(s)	Volume	Typing/ Crossmatching	Filter	Storage
Platelets (NOTE: This component is suspended in plasma.)	Restoring adequate numbers of platelets; treating suspected or confirmed bleeding disorders (NOTE: The normal platelet count is 200,000 to 300,000/cu mm. Administration is ordered when patient's count drops to 20,000 or below, and patient is in danger of spontaneous hemorrhage.)	30 to 50 milliliters per unit (NOTE: Volume varies according to amount of plasma used. Product is usually ordered in multiple units, which are combined into one container in laboratory.)	ABO typing preferred (NOTE: If ABO typing is not done, the plasma in which the platelets are suspended must be *absolutely* red-cell free.)	No	Up to seventy-two hours; must be refrigerated **(CAUTION: Platelets must be agitated constantly during storage.)**
Plasma (NOTE: This component is the uncoagulated portion of blood with all red cells removed.)	Treating clotting factor deficiencies, severe hepatic disease, or replacing volume when red cells are not necessary	200 to 250 milliliters per unit (NOTE: Volume varies according to volume of red cells removed.)	ABO typing preferred (NOTE: If plasma is not ABO typed, it must be *absolutely* red-cell free.)	Yes (NOTE: A blood administration set includes a filter.)	Up to twelve months if frozen; up to six hours if fresh (NOTE: Most plasma used is frozen and will require a thirty minute thawing time before use.)
Plasma protein fraction (NOTE: This component is a 5 percent solution of selected proteins from pooled plasma in a buffered and stabilized diluent.)	Treating hypovolemic shock, hypoproteinemia, dehydration with electrolyte deficiencies in children; volume expander **(CAUTION: This product must not be used if patient has a clotting factor deficiency.)**	250 to 500 milliliters per unit	No	No	Up to three years at room temperature; up to five years when refrigerated

INFORMATION SHEET

Blood/Blood Products	**Use(s)**	**Volume**	**Typing/ Crossmatching**	**Filter**	**Storage**
Albumin (NOTE: Albumin is a heat treated, aqueous, chemically processed fraction of pooled plasma. It is available in 5% buffered saline or 25% salt-poor solution.)	Treating hypoproteinemia; helping to maintain electrolyte balance; preventing marked hemoconcentration; as a volume expander to treat shock syndromes	250 to 500 milliliters per unit (5% solution) 50 milliliters per unit (25% solution)	No	No (NOTE: The administration set is provided with this product.)	Up to three years at room temperature; up to five years refrigerated
Factor 8 (NOTE: This component is a cold-insoluble portion of the plasma recovered from fresh frozen plasma. It comes as a powder with a vial of diluent to be added to the powder by syringe.)	Treating hemophilia A **(CAUTION: This product is not to be used when the patient has an undefined coagulation defect.)**	50 milliliters	No **(CAUTION: This component contains low levels of A and P Rh factors; when large volumes are given, the patient must be monitored carefully for hemolysis.)**	No (NOTE: The administration set is provided with this product.)	Up to one year; must be refrigerated **(CAUTION: Do not freeze this product.)**
Factor 9 (NOTE: This component is a lyophilized, commercially prepared solution drawn from pooled plasma. It comes as a powder with a diluent to be added to the powder by syringe.)	Treating congenital deficiency of this factor to provide hemostatic levels; arresting severe hemorrhaging **(CAUTION: This product should not be used if patient has hepatic disease resulting in fibrinolysis, or when patient has intravascular coagulation and is not on heparin therapy.)**	50 milliliters per vial	No	No (NOTE: The administration set is provided with this product.)	Each unit has expiration date; must be refrigerated

INFORMATION SHEET

VI. Infusion guidelines for blood and blood products

A. Whole blood

1. Use blood administration set and large-gauge venous needle or catheter (16- or 18-gauge ONC or 19-gauge wing-tipped needle)

   (NOTE: Piggybacking into an existing IV line with a large-gauge needle is *not* preferred; if used, the IV tubing below the piggyback port must be cleared with normal saline of any existing solution. Use normal saline before infusion is begun and again when infusion is complete.)

2. Do not allow infusion time to exceed four hours

   (CAUTION: Whole blood can be infused through a small venous needle or catheter, but must not be infused in less than two to three hours or the cells will be destroyed.)

3. Infuse *only* with normal saline IV solution

4. Use extreme care if using an infusion pump

   (NOTE: Read manufacturer's specifications carefully.)

5. Monitor for fluid overload

B. Red blood cells

1. Use blood administration set and large-gauge venous needle or catheter (16- or 18-gauge ONC or 19-gauge wing-tipped needle)

   (NOTE: Piggybacking into an existing line with a large-gauge needle is *not* preferred; if used, the IV tubing below the piggy-back port must be cleared with normal saline of any existing solution. Use normal saline before infusion is begun and again when infusion is complete.)

2. Do not allow infusion time to exceed four hours

   (CAUTION: If RBCs must be infused through a smaller needle or catheter they must not be infused in less than two to three hours or the cells will be destroyed. It probably will be impossible to infuse the RBCs in less than three hours.)

3. Infuse *only* with normal saline IV solution

4. Use extreme care if using an infusion pump

C. White blood cells

1. Use blood administration set and moderate-gauge venous needle or catheter (18- to 20-gauge)

INFORMATION SHEET

2. Do not allow infusion time to exceed two hours

3. Infuse with any IV solution that is completely red-cell free

   (CAUTION: If not completely red-cell free, solution must be infused with normal saline. Check with laboratory to determine if red-cell free.)

4. Monitor for development of untoward reactions

   EXAMPLES: Fever, mild hypertension, severe chills, disorientation, hallucinations

D. Platelets

1. Infuse with moderate-gauge venous needle or catheter (18- to 23-gauge)

2. Infuse as rapidly as possible

   (NOTE: Platelets will clump if not agitated or infused rapidly.)

3. Can be given by IV push

   (CAUTION: If there is a possibility of fluid overload and the infusion time must be longer, platelets must be agitated as often as every three to five minutes.)

4. Can be piggybacked into an existing line by a straight-line IV tubing

5. Avoid use of infusion pump

6. Infuse with any IV solution if platelets are completely red-cell free

   (CAUTION: If plasma in which platelets are suspended is not absolutely red-cell free, platelets must be infused with normal saline only. Check with laboratory to determine if red-cell free.)

7. Flush administration line with normal saline (if not red-cell free) or D_5W (if red-cell free) after completion of infusion

   (NOTE: Line is flushed to ensure that all of the product enters the patient.)

8. Monitor for allergic reactions

E. Plasma

1. Use blood administration set and moderate-gauge venous needle or catheter (18- to 20-gauge)

   (NOTE: Piggybacking into an existing line is *not* preferred; if used, infuse through large-gauge needle.)

INFORMATION SHEET

2. Infuse with any IV solution if plasma is completely red-cell free

   (CAUTION: If plasma is not absolutely red-cell free, it must be infused with normal saline only. Check with laboratory to determine if red-cell free.)

3. May not be possible to use infusion pump

   (NOTE: If infusion pump has a drop sensor, it may not deliver opaque fluids.)

   (CAUTION: The manufacturer's specifications for each pump must be checked.)

4. Infuse thawed frozen plasma within two hours

5. Infuse fresh drawn plasma within six hours

F. Plasma protein fraction

1. Infuse with any size venous needle or catheter

   (NOTE: The smaller the gauge, the slower the product will infuse.)

2. Infuse at a rate depending on patient's condition and response

   (NOTE: When used to treat hypovolemic shock or as a volume expander, infuse rapidly until blood pressure rises to an acceptable level. When used to treat electrolyte deficiencies or hypoproteinemia, infuse more slowly, such as over one to two hours.)

3. Can be infused with most IV solutions

   (CAUTION: Plasma protein fraction must not be infused with protein hydrolysate solution, such as the amino-acid solutions, or with solutions containing alcohol.)

4. Can be piggybacked into an existing line with a large-gauge needle

5. May not be possible to use infusion pump

   (NOTE: If infusion pump has a drop sensor, it may not deliver opaque fluids.)

   (CAUTION: The manufacturer's specifications for each pump must be checked.)

G. Albumin

1. Infuse with any size venous needle or catheter

   (NOTE: The smaller the gauge, the slower the product will infuse.)

INFORMATION SHEET

2. Infuse at a rate depending on the patient's condition and response

   (NOTE: When used to treat shock, infuse rapidly until blood pressure rises to an acceptable level. When used to treat hypoproteinemia, to help maintain electrolyte balance, or to prevent marked hemoconcentration, infuse more slowly, such as over one to two hours.)

3. Can be infused with most IV solutions

   (CAUTION: Albumin must not be infused with protein hydrolysate solutions, such as the amino-acid solutions, or with solutions containing alcohol.)

4. Can be piggybacked into an existing line with a large-gauge needle

5. May not be possible to use infusion pump

   (NOTE: If pump has a drop sensor, it may not deliver opaque fluids.)

   (CAUTION: The manufacturer's specifications for each pump must be checked.)

H. Factor 8

1. Infuse with any size venous needle or catheter
2. Can be administered by IV push or intermittent infusion
3. Infuse at a rate comfortable to patient

   EXAMPLE: 25 milliliters over five minutes

4. Can be infused with most IV solutions
5. Can be piggybacked into an existing line
6. Avoid use of an infusion pump
7. Complete infusion within six hours after diluent is added to powder
8. Flush administration line with IV solution after completion of prescribed dose

   (NOTE: Line is flushed to ensure that all of the product enters the patient.)

I. Factor 9

1. Infuse with any size venous needle or catheter

   (CAUTION: Use only plastic syringes with this product. Follow manufacturer's instructions exactly when preparing for use.)

INFORMATION SHEET

2. Can be administered by IV push or intermittent infusion
3. Can be infused with most IV solutions
4. Can be piggybacked into an existing line
5. Avoid use of infusion pump
6. Complete infusion within one hour after diluent is added to powder
7. Flush administration line with IV solution after completion of prescribed dose

   (NOTE: Line is flushed to ensure that all of the product enters the patient.)

VII. Steps to follow for infusion of blood and blood products

A. Check doctor's original order to confirm need for product

B. Fill out forms properly (Assignment Sheet #1)

(NOTE: Most hospitals use the same requisition form to order blood and blood products. There are usually four or five carbon copies on each. Only one is placed on the patient's chart.)

C. Obtain nursing history to include previous transfusion reaction and/or possible disease states

D. Choose proper administration set

E. Choose microaggregate filter, if needed, and fill properly (Job Sheet #4)

(NOTE: These filters can be added as an extra filtering device when giving blood. They are composed of beds of silicone and are approximately 20 microns in size.)

F. Fill blood administration set properly with IV solution (Job Sheets #1-#3)

G. Perform venipuncture

(NOTE: It is imperative to have a patent IV line before blood is obtained.)

H. Obtain product from blood bank (Job Sheets #5 and #6)

I. Identify blood or blood product with the patient (Job Sheets #7 and #8)

J. Obtain vital signs as specified for each product

K. Know signs and symptoms of reactions

INFORMATION SHEET

L. Monitor patient for signs of complications and/or reactions

M. Monitor IV site carefully for signs of infiltration

N. Discontinue IV *immediately* if infiltration occurs

(CAUTION: Place a sterile needle over the distal tip of the administration set to keep the line sterile.)

(NOTE: In this instance you will reuse the same tubing so as not to waste precious blood or blood products.)

O. Restart IV immediately, using other arm if possible

(NOTE: Check to see if your hospital has a policy or standing orders for treatment of infiltration of blood or blood products.)

P. Warm blood if multiple successive units are to be given

(NOTE: There are commercial warmers available, but your hospital may not have one. Another technique is to run the IV tubing under the length of the patient's back with the patient's consent.)

Q. Administer IV medications through an alternate site and line, *never* through the site and line being used for blood or blood product

(CAUTION: A medication must never be added to the blood.)

(NOTE: If a medication is due during the time of the infusion, it must be postponed and rescheduled or another IV site and line must be established.)

R. Infuse within proper length of time (Assignment Sheet #2; Job Sheets #9-#14)

S. Chart blood or blood product on proper chart forms

(NOTE: It is your responsibility to know which forms your hospital uses for the charting of blood and blood products.)

T. Document carefully all of your assessments, observations, and actions on proper chart forms

U. Make sure that any required laboratory tests are ordered, completed, and reported

(NOTE: Often after blood and/or blood products are given, repeat or follow up laboratory tests are ordered.)

INFORMATION SHEET

VIII. Terms and definitions associated with hazards of transfusing blood and blood products (Assignment Sheet #4)

A. Antipyretic--Anything that reduces fever

B. Ascertain--To find out with certainty

C. Aseptic--Free from disease-producing microorganisms

D. Atopic--Allergy causing

E. Compatible--Not opposed to

F. Distal--Farthest from point of attachment

G. Incompatible--Not capable of uniting

H. Lipopolysaccharides--Fatty carbohydrates

I. Pruritis--Severe itching of the skin

J. Rale--Abnormal breath sound heard when listening to the chest

K. Reaction--Response of an organism to a stimulus

L. Sensitivity-Abnormal susceptiblity to a substance

M. Urticaria--Vascular reaction of skin characterized by eruptions of pale, short-lived wheals associated with severe itching; hives

INFORMATION SHEET

IX. Hazards associated with blood and blood product transfusions

Hazard	Occurrence	Cause	Prevention	Signs/symptoms
Hemolytic reaction (NOTE: Hemolytic refers to a breaking down of red blood cells.)	Uncommon; may be fatal	Incompatibility of the ABO or Rh type (NOTE: Incompatibility causes destruction of the patient's own red blood cells.)	Careful typing, crossmatching, labeling, and identification	Chills; fever; low back pain; chest pain and/or tightness; dyspnea; decreased blood pressure; nausea and/or vomiting; bleeding abnormalities such as oozing from venipuncture site, blood in urine, bleeding from gums (NOTE: Chills must be carefully assessed. Infusion of large amounts of cold blood may cause chills.)
Febrile reaction	Common; not serious	Bacterial lipopolysaccharides in blood	Strict aseptic technique when blood is drawn and transfused Use of saline-washed red cells or frozen saline-washed red cells if history is positive for febrile reactions (NOTE: These products must be ordered specifically by the doctor. The nurse can alert doctor to a previous febrile reaction.)	Mild to severe chills and fever; extreme symptoms resemble a hemolytic reaction (NOTE: Symptoms can be lessened by the administration of antipyretic medications such as aspirin or acetaminophen and antihistamines.)
Allergic reaction	Common; not serious	Atopic substance in blood		Pruritis, urticaria, facial swelling, chills, fever, nausea and/or vomiting (NOTE: Symptoms can be lessened by the administration of antihistamines.)
Plasma protein incompatibility	Uncommon but serious; may be fatal	IgA incompatibility	Crossmatching for IgA incompatibility	Facial flushing, abdominal pain, diarrhea, chills, fever, dyspnea, decreased blood pressure

INFORMATION SHEET

Hazard	Occurrence	Cause	Prevention	Signs/symptoms
Blood contamination	Uncommon; serious; may be fatal	Gram negative bacteria in blood	Use of air-free, touch-free methods to draw blood; maintaining strict storage control; strict adherence to aseptic administration technique	Chills, fever, vomiting, diarrhea, decreased blood pressure, vascular collapse, shock
Fluid overload	Common; serious but usually treatable	Giving too large amount of blood or giving blood product too quickly for patient's hemodynamic status	Use of packed red cells if possible; identification of high risk patients EXAMPLE: Patients with cardiac or renal disease (NOTE: If the patient must have blood or blood products and is high risk, the laboratory can divide the unit in two and keep one-half under proper storage. This way a unit of blood can be given over eight hours.)	Increased respiratory rate without apparent cause, dry hacky cough, dyspnea, neck vein distention, increased pulse rate without apparent cause, rales (NOTE: If unrecognized and untreated, fluid overload can proceed to acute pulmonary edema.)
Disease transmission	Common; can be serious	Presence of transmissible disease in blood EXAMPLES: Hepatitis B, malaria	Carefully screened blood donors	Vary according to disease transmitted; do not show up immediately

INFORMATION SHEET

X. Nursing responsibilities and interventions with regard to hazards of transfusing blood and blood products

  A. Hemolytic reaction

    1. Begin transfusion slowly
    2. Stay with patient during first ten to twenty minutes of transfusion
    3. Remove blood and tubing immediately when reaction is suspected, but keep vein open by hanging fresh normal saline IV solution and tubing down to needle or catheter

       (NOTE: Cap distal tip of blood tubing with a sterile needle to prevent contamination of blood.)

    4. Have another nurse stay with patient and monitor vital signs
    5. Notify doctor
    6. Follow your hospital's policy and procedure for transfusion reactions

       (NOTE: It is your responsibility to obtain and know this policy and procedure. Procedure usually includes sending unit of blood with tubing to laboratory, obtaining blood and urine samples, and filling out reaction forms.)

    7. Administer any ordered drugs promptly
    8. Obtain and fill out reaction forms (Assignment Sheet #3)
    9. Reassure patient and family
    10. Monitor vital signs, including temperature and urine output, as indicated by patient's condition
    11. Document carefully all of your assessments, observations, and actions on proper chart forms

  B. Febrile reaction

    1. Stay with patient during first ten to twenty minutes of transfusion
    2. Notify doctor
    3. Administer ordered antipyretic medications promptly
    4. Keep patient warm
    5. Reassure patient and family

INFORMATION SHEET

6. Monitor vital signs, including temperature and urine output, as indicated by patient's condition
7. Follow your hospital's policy and procedure for transfusion reactions
8. Obtain and fill out reaction forms
9. Document carefully all of your assessments, observations, and actions on proper chart forms

C. Allergic reaction

1. Stay with patient during first ten to twenty minutes of transfusion
2. Notify doctor
3. Administer any ordered drugs promptly
4. Position patient comfortably
5. Reassure patient and family
6. Monitor vital signs, including temperature and urine output, as indicated by patient's condition
7. Follow your hospital's policy and procedure for transfusion reactions
8. Obtain and fill out reaction forms
9. Document carefully all of your assessments, observations, and actions on proper chart forms

D. Plasma protein incompatibility

1. Stay with patient during first ten to twenty minutes of transfusion
2. Remove blood and tubing immediately when reaction is suspected, but keep vein open by hanging fresh normal saline IV solution and tubing down to needle or catheter

   (NOTE: Cap distal tip of blood tubing with a sterile needle to prevent contamination of blood.)
3. Have another nurse stay with patient and monitor vital signs
4. Notify doctor
5. Follow your hospital's policy and procedure for transfusion reactions

INFORMATION SHEET

6. Obtain and fill out reaction forms

7. Administer drugs, oxygen, and fluids promptly as ordered

8. Monitor vital signs, including temperature and urine output, as indicated by patient's condition

9. Reassure patient and family

10. Document carefully all of your assessments, observations, and actions on proper chart forms

E. Blood contamination

1. Use strict aseptic technique throughout all procedures

2. Never allow a unit of blood to hang over four hours

3. Never infuse over two units of blood or blood product through one tubing if given continuously

4. Never allow a tubing and/or filter to hang over four hours between units

5. Remove blood and tubing immediately when reaction is suspected, but keep vein open by hanging fresh normal saline IV solution and tubing down to needle or catheter

   (NOTE: Cap distal tip of blood tubing with a sterile needle to prevent contamination of blood.)

6. Notify doctor

7. Follow your hospital's policy and procedure for transfusion reactions

8. Obtain and fill out reaction forms

9. Monitor vital signs, including temperature and urine output, as indicated by patient's condition

10. Reassure patient and family

11. Administer any ordered drugs promptly

12. Document carefully all of your assessments, observations, and actions on proper chart forms

F. Fluid overload

1. Use infusion pump if possible

2. Use volume control device for high risk patients

INFORMATION SHEET

3. Turn transfusion off when overload is suspected and keep vein open with normal saline until orders are received
4. Position patient comfortably
5. Notify doctor
6. Administer ordered drugs and treatments promptly
7. Reassure patient and family
8. Monitor vital signs, including temperature and urine output, as indicated by patient's condition
9. Document carefully all of your assessments, observations, and actions on proper chart form

G. Disease transmission

1. Encourage good voluntary donor program
2. Give blood as a voluntary donor

XI. Volume expanders and their actions

A. Are colloids used to treat low circulating volume

B. Do not pass through capillary walls into interstitial spaces and cells

C. Pull fluid from intracellular compartment into circulating volume by osmosis as blood flows through capillary beds from arterial system to venous system

(NOTE: Movement of fluids is greater from venous system due to higher pressure at arterial end.)

XII. Characteristics of biologic volume expanders

A. Normal serum albumin

(NOTE: Some brand names are Albumisol, Albutein, Buminate, and Plasbumin.)

1. Solution is either a 5 percent or 25 percent concentration

   (NOTE: This protein is extracted from the plasma and 90 percent is albumin, with the rest being alpha and beta globulins suspended in plasma.)

2. 5% solution is osmotically equivalent to blood and will draw an equal volume of fluid into circulating volume

   EXAMPLE: Fifty milliliters of 5% albumin will draw 50 milliliters of fluid into blood.

INFORMATION SHEET

3. 25% solution has five times the osmotic pressure of blood and will draw five times its volume of fluid into circulating volume

   EXAMPLE: Fifty milliliters of 25% albumin will draw 250 milliliters of fluid into blood.

4. Used to treat hypoproteinemia and low circulating volume

5. Sensitivity reactions can occur but are rare

B. Plasma protein fraction

(NOTE: Some brand names are Plasma-Plex, Plasmatein, Proteinate. These products are less expensive than normal serum albumin.)

1. Solution is a 5 percent concentration of selected proteins from pooled plasma in buffered, stabilized saline

   (NOTE: This protein is extracted from the plasma and 83 percent is albumin with the rest being alpha and beta globulins.)

2. Osmotically equivalent to blood and will draw an equal volume of fluid into circulating volume

   EXAMPLE: Fifty milliliters will draw 50 milliliters fluid into blood.

3. Used to treat hypoproteinemia and low circulating volume

4. Pasteurized to reduce risk of hepatitis

5. Sensitivity reactions can occur but are rare

XIII. How synthetic volume expanders differ from biologic volume expanders

A. Are substances manufactured from glucose

(NOTE: Their effects resemble the colloidal properties of biologic expanders.)

B. Come in two solutions--dextran-70 and dextran-40

(NOTE: Some brand names for dextran-70 are Gentran 70 and Macrodex; some brand names for dextran-40 are Gentran 40 and Rheomacrodex.)

C. Used as an anticoagulant

(NOTE: They reduce the coagulability of the blood by reducing the ability of the platelets to adhere to anything.)

INFORMATION SHEET

D. Used to improve microcirculation

(NOTE: Synthetic volume expanders decrease the viscosity of the blood.)

E. Effects last twenty-four hours

(NOTE: Synthetic volume expanders are slowly changed to glucose in the body, and are then eliminated in the urine.)

XIV. Nursing responsibilities and interventions with regard to volume expanders

A. Obtain nursing history with regard to loss of large amounts of fluid and/or existing cardiac or renal problems

B. Infuse at rate of 5 milliliters per minute if patient is hypovolemic; reduce rate as blood pressure reaches acceptable level

C. Infuse at 1 milliliter per minute if given for hypoproteinemia; if you see no signs of fluid overload in fifteen to twenty minutes, increase to 2 milliliters per minute

(CAUTION: Do not infuse at more than 1/2 to 1 milliliter per minute if treating hypoproteinemia and the patient is at high risk of fluid overload.)

D. Monitor vital signs as indicated

EXAMPLES: Hypovolemia, every fifteen minutes; hypoproteinemia, routine

E. Observe for sensitivity reactions

(NOTE: Nasal congestion is often first sign and can even progress to a full anaphylactic reaction.)

F. Observe for signs of fluid overload

G. Observe for bleeding tendencies for twenty-four hours if using synthetic expanders

H. Notify laboratory of use of volume expanders

(NOTE: These products can interfere with some lab results.)

EXAMPLES: Lower hematocrit, prolong PT and PTT

I. Explain the use of these products to patient and family

J. Document carefully all of your assessments, observations, and actions on the proper chart forms

BLOOD, BLOOD PRODUCTS, VOLUME EXPANDERS
UNIT XII

ASSIGNMENT SHEET #1--FILL OUT REQUISITION FORMS ASSOCIATED WITH BLOOD AND BLOOD PRODUCTS

NAME ________________________________ SCORE ______________

This assignment will give you practice in completing the forms required when requesting blood or blood products. It is your responsibility to find out how to properly fill out the forms used in your institution.

A. Read the following case study, and then fill out the accompanying requisition form to order the blood. Since you don't have a stamp plate or machine, you will have to hand write the required information on the requisitions.

Mr. U. B. Careful, 42 years old, admitted on 4/7/80, to private room 1024 with hospital number 8 960 4021. Mr. Careful's home address is 402 S.W. 94th St., Anywhere, OK. and his telephone number is 555-4621. Dr. R. Hope has ordered one unit of packed cells to be given today. Mr. Careful's admission hemoglobin and hematocrit are 10.2 and 34.6, respectively.

ASSIGNMENT SHEET #1

Crossmatch--Transfusion Request
Fill out one for each unit requested

XYZ Medical Center, Anywhere, OK

Transfusion Number		Donor Number	
Recipient		**Donor**	
Group and Type		Group and Type	

I certify that compatibility between donor and patient was established.

Tech. ______________________

Date ______________ Time ______________

Product and Amount

	Whole Blood		Platelet Concentrate
	Packed Cells		
	Fresh Frozen Plasma		Component Pool
	White Blood Cells	☐ Other Specify	
	Platelet Pheresis		
		Charge $	

Inspected And Issued by	Received by
Date	Time ☐ AM ☐ PM
If Blood Returned to Blood Bank	
Accepted by	
Date	Time ☐ AM ☐ PM
Date / /	Time ☐ AM ☐ PM

Total Number Units Ordered ______________________

We certify that before starting transfusion we have checked the key transfusion numbers appearing on (1) Recipient's Blood Band, (2) unit to be transfused and (3) crossmatch and transfusion request. All have identical numbers.

Transfusion No.: ______________________
Signature

Signature

Date Time Coml

Time Started

Amount Infused
☐ ¼ ☐ ½ ☐ ¾ ☐ All

Reaction ☐ Yes ☐ No
If yes, prepare and submit transfusion reaction form.

Pre-Transfusion		Post-Transfusion
________	Temp.	________
________	Pulse	________
________	B.P.	________

ASSIGNMENT SHEET #1

B. Fill out the accompanying requisition form to obtain the blood from the blood bank.

XYZ Medical Center
Anywhere, Oklahoma

Name ____________________
Address ____________ Phone No. ________
Doctor ____________________
Hospital No. ____________________
Signature of Nurse ____________________
Blood Issued by ____________________
Blood Received by ____________________
Date ____________________

Blood Bank Requisition

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

ASSIGNMENT SHEET #2--CALCULATE FLOW RATES FOR BLOOD AND BLOOD PRODUCTS

NAME ______________________________ SCORE ______________

This assignment will give you more experience in calculating flow rates. Calculate the flow rate in drops per minute for the following orders.

A. Doctor's order: Give ṫ unit packed cells over 3 hrs. The blood administration set delivers 15 drops per milliliter.

gtt/min = ____________________

B. Doctor's order: Give ṫ unit whole blood over 4 hrs. The blood administration set delivers 6 drops per milliliter.

gtt/min = ____________________

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

ASSIGNMENT SHEET #3--FILL OUT FORM FOR REPORTING A SUSPECTED TRANSFUSION REACTION

NAME ______________________________ SCORE ______________

You will be monitoring the patient during a transfusion of blood. Any time a patient experiences an untoward reaction, a transfusion reaction form must be completed. This assignment sheet will give you experience in the completion of the form and make you more comfortable in the actual clinical setting.

CASE STUDY

Admission Information

1. Name: W. B. Cee
2. Age: 60
3. Date: 6-20-82
4. Room: 510
5. Hospital Number: 44510
6. Physician: Dr. B. Doppler
7. Diagnosis: Unexplained low hemoglobin and hematocrit
8. Current Medications:
    a. Tagamet 150 mg. P.O., t.i.d.
    b. Colace at HS
9. Allergies:
    a. Corn
    b. Strawberries
    c. Dust
10. History negative for previous transfusions

Admitting Doctor's Orders

1. Type and crossmatch for 3 units of packed red cells
2. Start IV at KO rate with normal saline
3. Give blood as soon as ready
4. Run each unit over 3 hours

Situation at 5:10 P.M.

1. VS
    a. T--99.2
    b. P--104
    c. R--20
    d. BP--160/82
2. Blood hung by IV therapy team
3. Specific blood unit information
    a. O-pos
    b. Donor number 2RD06

ASSIGNMENT SHEET #3

Situation at 5:30 P.M.

1. As nurse was monitoring transfusion and straightening room, Mr. Cec complained of
    a. Feeling cold
    b. Itching all over
2. Nurse observed
    a. Chills
    b. Giant hives over face and chest
3. VS
    a. T--100
    b. P--124
    c. R--26
    d. BP--170/94
4. Nursing interventions
    a. Transfusion stopped; approximately 50 ml infused
    b. Physician notified
5. Doctor's orders
    a. Send blood to lab for complete retype and recrossmatch
    b. Benadryl 50 mg IM now

Situation at 5:45 P.M.

1. Blood returned to laboratory
2. Lab technician in room to draw blood
3. VS
    a. T--100
    b. P--120
    c. R--22
    d. BP--152/90

Situation at 6:30 P.M.

1. Urine specimen sent to laboratory
2. Itching relieved
3. No changes in hives
4. Chills relieved
5. VS
    a. T--99.2
    b. P--108
    c. R--20
    d. BP--156/88

Fill out the report of suspected transfusion reaction on the following page.

ASSIGNMENT SHEET #3

XYZ MEDICAL CENTER
REPORT OF SUSPECTED TRANSFUSION REACTION

NOTE: ALL BLANKS MUST BE FILLED IN COMPLETELY.

Patient's Name ____________________ Date __________

Hospital Number __________ Room No. __________ Donor No. ______

Doctor ______________ Diagnosis ______________

Has patient received a transfusion before? __________ When? __________

Patient's temperature at start of transfusion __________ At end __________

Patient observed closely for first __________ cc's of blood given.

Time transfusion was started __________ Time transfusion stopped ______

Transfusion resumed __________ Time __________

Amount of blood given ____________________

Was anything else given with the blood? __________ If so, what? __________

Physician called Yes _____ No _____ Name __________ Time ______

Response of physician ____________________

Notified laboratory ____________________ Time ______

Initial urine specimen sent to laboratory __________ Time ______

Unused bottle of blood returned __________ Time ______

SYMPTOMS NOTED:	Immediate	Late
Chill	__________	__________
Fever (and degree)	__________	__________
Dyspnea	__________	__________
Nausea	__________	__________
Pain & location	__________	__________
Urticaria	__________	__________
Hematuria	__________	__________
Shock	__________	__________
Jaundice	__________	__________

Additional information ____________________

____

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

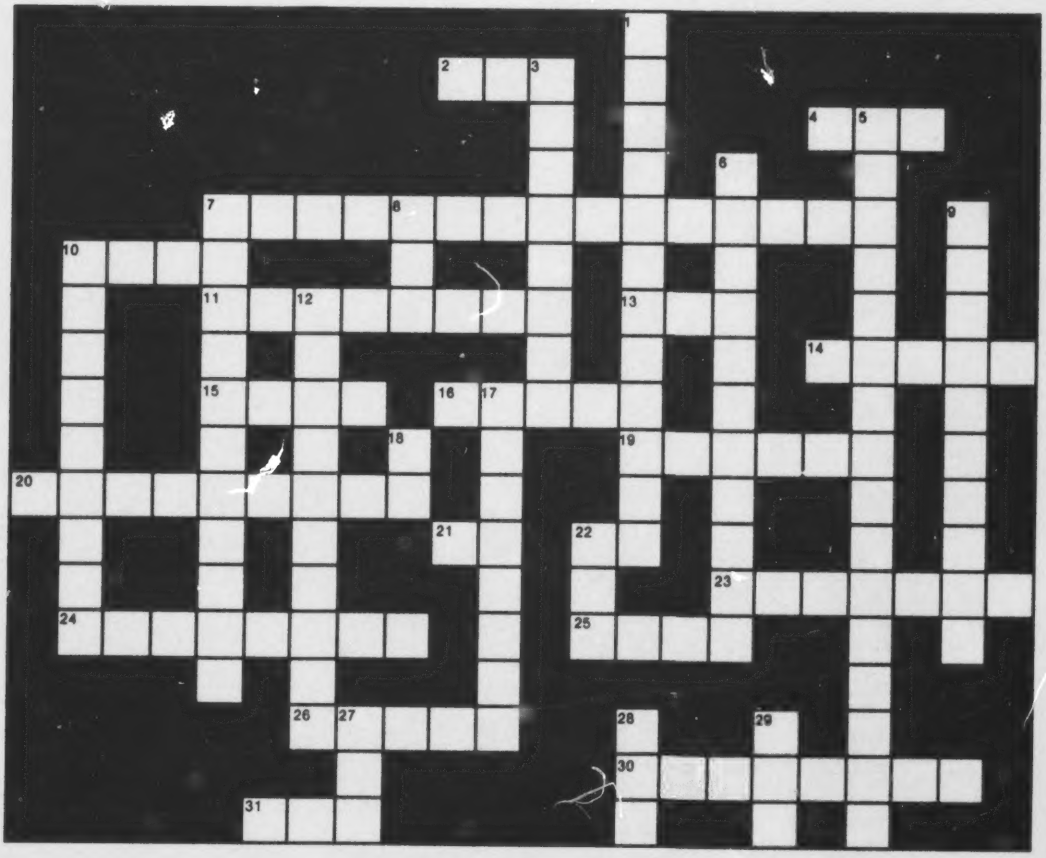
ASSIGNMENT SHEET #4--COMPLETE BLOOD AND BLOOD PRODUCTS CROSSWORD PUZZLES

NAME ______________________________ SCORE ______________

This assignment will help familiarize you with terms and definitions associated with blood, blood products, and volume expanders.

PART I

Use the clues on the following page and Sections I and II of your Information Sheet to complete the crossword puzzle below.



ASSIGNMENT SHEET #4

ACROSS

2. Immunoglobulin gamma A (abbr.)
4. Hemoglobin (abbr.)
7. Low body protein
10. Remain
11. Small roundish disc found in blood and associated with blood clotting
13. Opposite of *in*
14. Hemo-
15. Sleeveless jacket
16. Composition
19. At rest; inactive; stationary
20. Disintegration and destruction of red blood cells
21. Blood pressure (abbr.)
22. _ _ is; adverb
23. Tendency of fluids to pass through a semipermeable membrane to equalize concentration on both sides of the membrane
24. Any matter that settles to the bottom of a liquid
25. Opposite of *closed*
26. Two born at the same birth
30. To rapidly freeze a substance at an extremely low temperature and then dehydrate that substance in a vacuum
31. Red blood cells (abbr.)

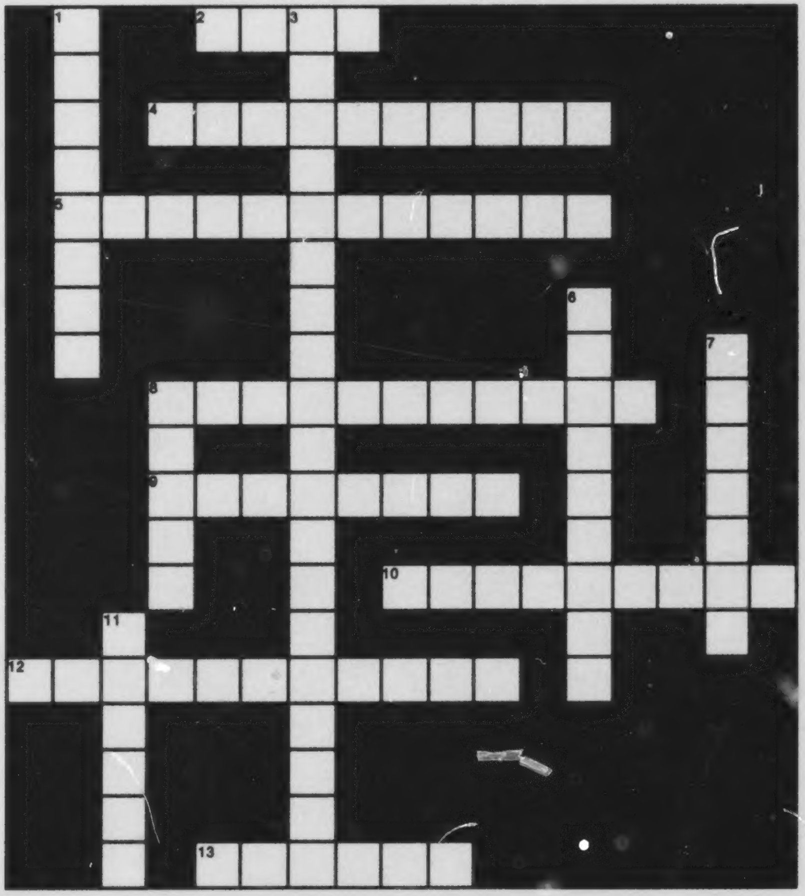
DOWN

1. Disintegration of fibrin, the protein that promotes clotting
3. Movement of a container so that the contents are mixed
5. Abnormal reduction of one type of white blood cells
6. Act of bringing back to a former or normal state
7. Low circulating volume of fluid
8. Prefix meaning *before*
9. Capable of stopping the flow of blood
10. Combination of parts to make a whole
12. Evaluation
17. To hold or keep particles in a liquid in suspension; to hang
18. Vital signs (abbr.)
22. Letters denoting blood group types
27. White blood cells (abbr.)
28. Human leukocyte group A antigen (abbr.)
29. Nil per os (abbr.)

ASSIGNMENT SHEET #4

PART II

Use the clues on the following page and Section VIII of your Information Sheet to complete the crossword puzzle below.



ASSIGNMENT SHEET #4

ACROSS

2. Abnormal breath sound heard when listening to the chest
4. Not opposed to
5. Not capable of uniting
8. Abnormal susceptibility to a substance
9. Response of an organism to a stimulus
10. To find out with certainty
12. Anything that reduces fever
13. Farthest from point of attachment

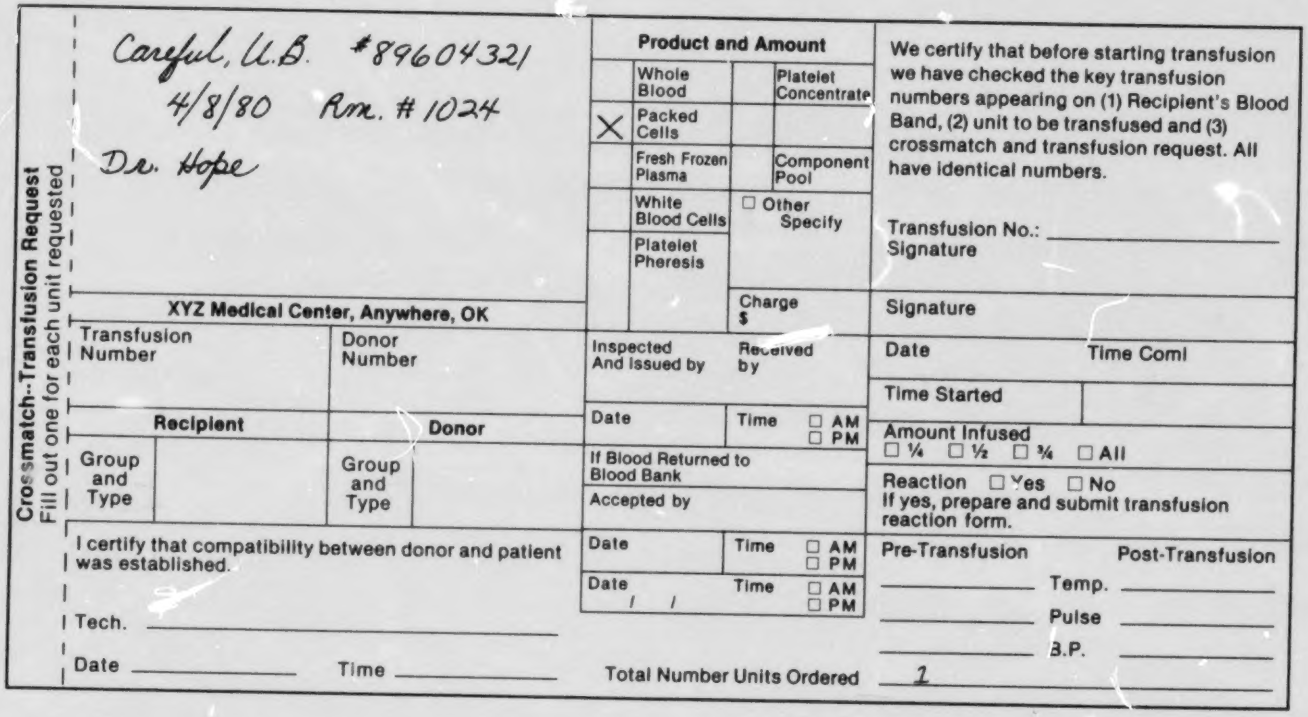
DOWN

1. Severe itching of the skin
3. Fatty carbohydrates
6. Vascular reaction of skin characterized by eruptions of pale, short-lived wheals associated with severe itching; hives
7. Free from disease-producing microorganisms
8. Watery fluid in the blood; separates from blood clots after coagulation and shrinkage
11. Allergy causing

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1



Crossmatch--Transfusion Request
Fill out one for each unit requested

Careful, U.B. #89604321
4/8/80 Rm. #1024
Dr. Hope

XYZ Medical Center, Anywhere, OK

Product and Amount

	Whole Blood		Platelet Concentrate
☒	Packed Cells		
	Fresh Frozen Plasma		Component Pool
	White Blood Cells	☐ Other Specify	
	Platelet Pheresis	Charge $	

We certify that before starting transfusion we have checked the key transfusion numbers appearing on (1) Recipient's Blood Band, (2) unit to be transfused and (3) crossmatch and transfusion request. All have identical numbers.

Transfusion No.: ____________
Signature

Signature

Date Time Coml

Time Started

Amount Infused ☐ ¼ ☐ ½ ☐ ¾ ☐ All

Reaction ☐ Yes ☐ No
If yes, prepare and submit transfusion reaction form.

Transfusion Number		Donor Number	
Recipient		**Donor**	
Group and Type		Group and Type	

Inspected And Issued by
Received by

Date Time ☐ AM ☐ PM

If Blood Returned to Blood Bank

Accepted by

Date Time ☐ AM ☐ PM

Date / / Time ☐ AM ☐ PM

Pre-Transfusion		Post-Transfusion
____________	Temp.	____________
____________	Pulse	____________
____________	B.P.	____________

I certify that compatibility between donor and patient was established.

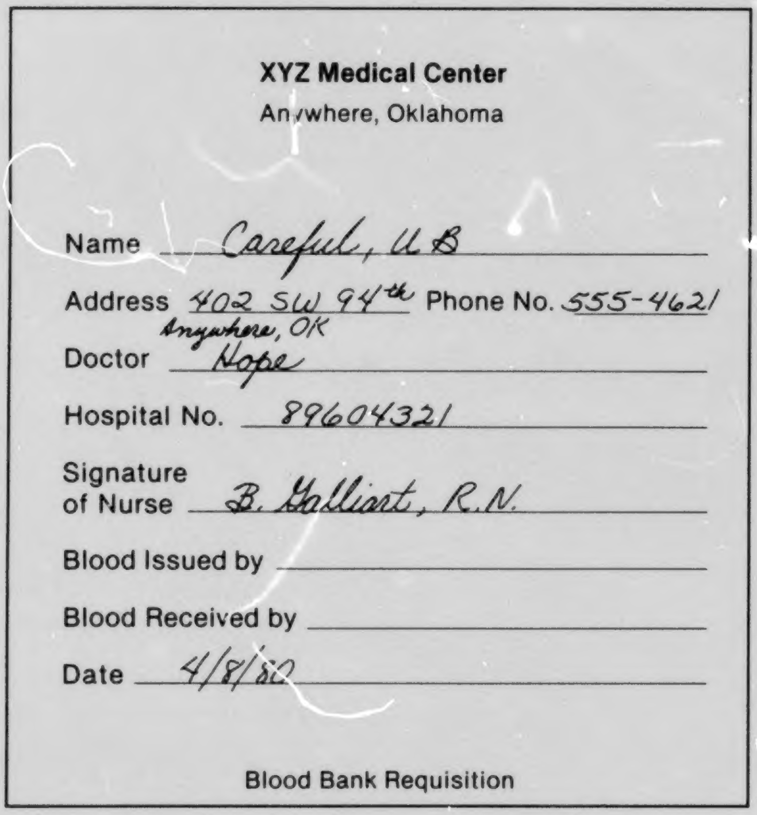
Tech. ____________

Date ____________ Time ____________

Total Number Units Ordered 1

IVT - 557

ANSWERS TO ASSIGNMENT SHEETS



XYZ Medical Center
Anywhere, Oklahoma

Name Careful, U B
Address 402 SW 94th Anywhere, OK Phone No. 555-4621
Doctor Hope
Hospital No. 89604321
Signature of Nurse B. Galliant, R.N.
Blood Issued by
Blood Received by
Date 4/8/80

Blood Bank Requisition

Assignment Sheet #2

A. 25 gtt/min

B. 12 gtt/min

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #3

XYZ MEDICAL CENTER
REPORT OF SUSPECTED TRANSFUSION REACTION

NOTE: ALL BLANKS MUST BE FILLED IN COMPLETELY!

Patient's Name W. B. Cee Date 6-20-82

Hospital Number 44510 Room No. 510 Donor No. 2R006

Doctor Doppler Diagnosis Unexplained low hemoglobin and hematocrit

Has patient received a transfusion before? no When?

Patient's temperature at start of transfusion 99.2 At end 100

Patient observed closely for first 25 cc's of blood given.

Time transfusion was started 5:10 PM Time transfusion stopped 5:30 PM

Transfusion resumed No Time

Amount of blood given approx. 50 ml

Was anything else given with the blood? no If so, what?

Physician called Yes ✓ No Name Doppler Time 5:40 PM

Response of physician Ordered retype + recrossmatch of blood + 50 mg Benadryl IM

Notified laboratory yes Time 5:45

Initial urine specimen sent to laboratory yes Time 6:30

Unused bottle of blood returned yes Time 5:45

SYMPTOMS NOTED:

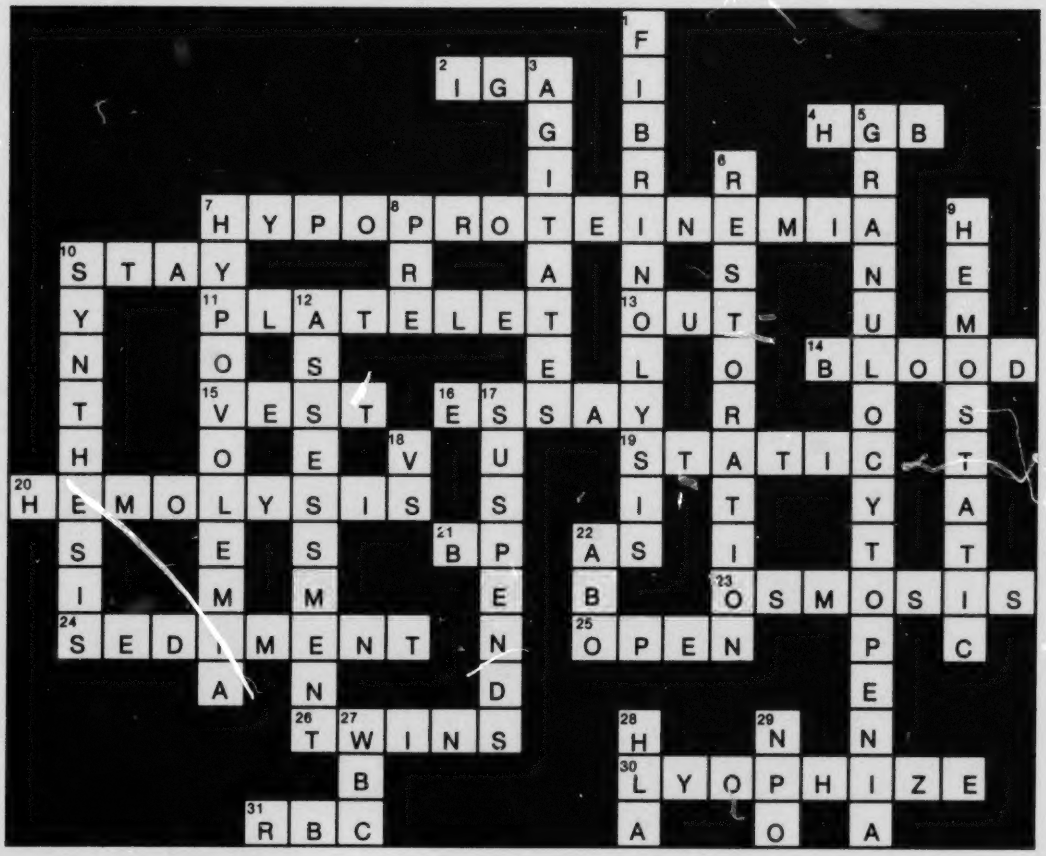
	Immediate	Late
Chill	✓	
Fever (and degree)	100°F	
Dyspnea		
Nausea		
Pain & location		
Urticaria	✓	
Hematuria		
Shock		
Jaundice		

Additional information Is allergic to corn, strawberries, and dust.

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #4

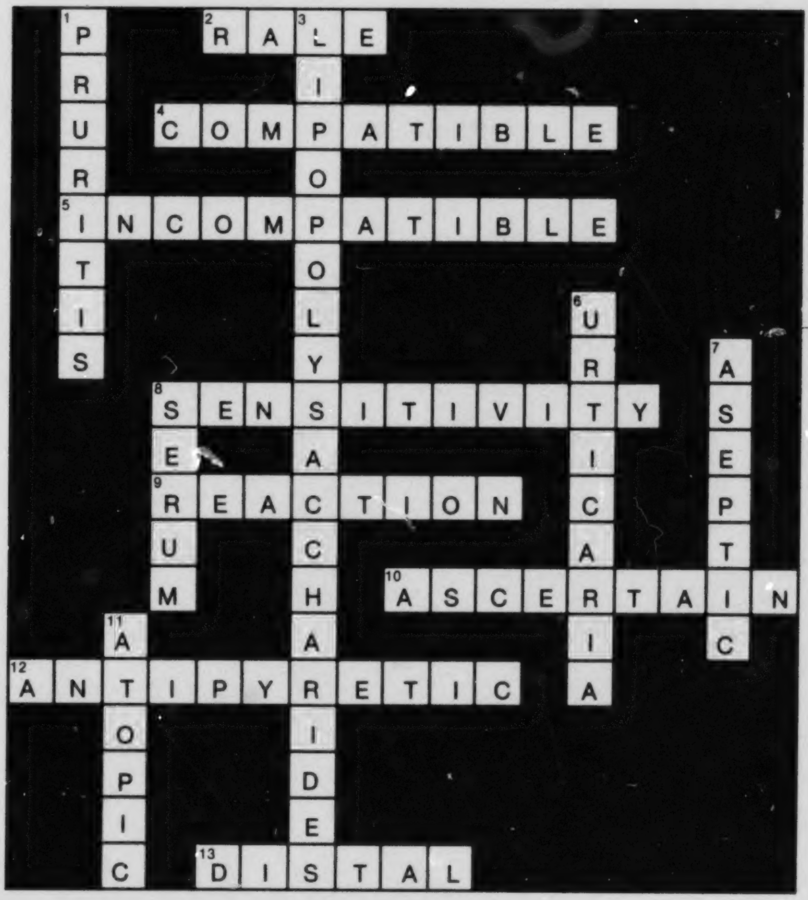
PART I



ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #4

PART II



BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #1--FILL STRAIGHT-LINE BLOOD TUBING

I. Equipment and materials

A. Prescribed blood or blood product

B. Straight-line blood tubing

(NOTE: Most blood and blood products today are in plastic bags and do not require a vented tubing.)

II. Procedure

A. Follow proper procedure for identification of blood or blood product

B. Obtain straight-line blood tubing and take to room along with blood or blood product

C. Follow proper procedure for patient and blood or blood product identification

D. Identify yourself to patient and/or family and explain procedure

E. Wash hands

F. Open tubing packaging and remove tubing

G. Move flow control clamp up under filter

H. Close flow control clamp

I. Remove protective cover from spike of tubing

(CAUTION: Carefully avoid touch contamination.)

J. Hold blood or blood product container with spike port up

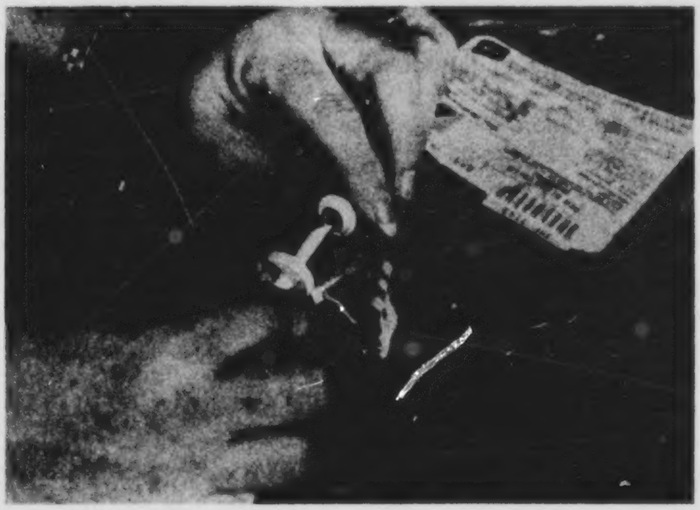
K. Pull apart plastic tabs covering spike port

JOB SHEET #1

L. Insert tubing spike into opened container spike port using a twisting motion (Figure 1)

(CAUTION: Use great care not to pierce the plastic bag.)

FIGURE 1



M. Gently rotate whole blood, packed cells, or platelets

N. Hang container from IV pole

O. Squeeze filter chamber above filter and fill chamber to completely cover filter

(CAUTION: Never squeeze the filter as this could damage it. Do not let the blood drip onto the filter as this will damage the cells.)

P. Open flow-control clamp, fill tubing, and then close clamp

(NOTE: The blood or blood product can now be connected directly into the needle or catheter. A less preferred method is to flush the existing line, through the secondary port, with normal saline and then to piggyback the product into this port. Obtain and know your hospital's policy.)

(CAUTION: Never infuse over two units through one tubing. Such a procedure is highly susceptible to the threat of bacterial contamination.)

Q. Wash hands before leaving room

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #2--FILL Y-TYPE BLOOD TUBING

I. Equipment and materals

A. Normal saline IV solution

B. Prescribed blood or blood product

C. Y-type blood tubing

(NOTE: Most blood and blood products come in plastic bags today and do not require a vented tubing, but if a nonvented glass bottle of normal saline is used, vented tubing will be required.)

D. Alcohol sponge

II. Procedure

A. Identify patient's need for blood or blood product by using appropriate communication tool

B. Obtain IV solution and equipment and take to room

C. Follow proper procedure for patient identification

D. Identify yourself to patient and/or family and explain procedure

E. Wash hands

F. Open tubing packaging and remove tubing

JOB SHEET #2

G. Move up flow-control clamps on upper Y-tubings to approximately half way between spikes and filter chamber; close both (Figure 2)

FIGURE 2

H. Move up flow-control clamp below filter chamber to just below chamber; close

I. Remove protective cover from spike port of normal saline solution

(NOTE: When using a glass bottle, place it on a firm surface. When using a plastic bag, hang it from the IV pole.)

J. Cleanse spike port of glass bottle thoroughly with alcohol sponge

K. Remove protective cap from spike of Y-tubing

(NOTE: Check directions on packaging of administration set with regard to proper spike for blood versus IV solution.)

(CAUTION: Carefully avoid touch contamination.)

L. Spike the normal saline container

JOB SHEET #2

M. Hang glass bottle from IV pole

N. Open flow-control clamp just below normal saline

O. Squeeze chamber above filter and fill chamber so that saline completely covers filter

(CAUTION: Never squeeze the filter as this could damage it.)

P. Open main flow-control clamp and fill tubing; then close both upper and lower clamps

Q. Perform venipuncture, or connect tubing to existing venipuncture, and establish flow

R. Obtain blood or blood product

S. Identify patient with blood, using proper procedure

T. Remove protective cover from unused spike of Y-tubing

(CAUTION: Carefully avoid touch contamination.)

U. Hold blood or blood product container with spike port up

V. Pull apart plastic tabs covering spike port of blood or blood product

W. Insert tubing spike into opened blood or blood product spike port with a twisting motion

(CAUTION: Take great care not to pierce the side of the bag.)

X. Gently rotate whole blood, packed cells, or platelets

Y. Hang blood or blood product container from IV pole

(NOTE: The blood or blood product can now be connected directly into the venous needle or catheter. A less preferred method is to flush the existing line, through the secondary port, with normal saline and then to piggyback the product into this port. Obtain and know your hospital's policy.)

Z. Close clamp below saline IV solution

(NOTE: If saline clamp is opened, the saline and blood or blood product will mix.)

AA. Begin infusion by opening clamp just below blood or blood product

JOB SHEET #2

BB. Adjust main flow-control clamp to prescribed flow rate; leave flow-control clamp below normal saline closed

(CAUTION: Blood tubing should never hang over four hours between units. Never infuse over two units through one tubing, due to the great threat of bacterial contamination.)

CC. Wash hands before leaving room

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #3 -FILL Y-TYPE BLOOD TUBING CONTAINING BUILT-IN PUMP

I. Equipment and materials

A. Normal saline IV solution

B. Prescribed blood or blood product

C. Y-type blood tubing with built-in pump

(NOTE: Most blood and blood products come in plastic bags today and do not require a vented tubing, but use of a nonvented glass bottle of normal saline will require a vented tubing.)

D. Alcohol sponge

II. Procedure

A. Identify patient's need for blood or blood products by using appropriate communication tool

B. Obtain IV solution and equipment and take to room

C. Follow proper procedure for patient identification

D. Identify yourself to patient and/or family and explain procedure

E. Wash hands

F. Open tubing packaging and remove tubing

G. Move up flow-control clamps on upper Y-tubing to approximately half way between spikes and filter chamber; close both

H. Move up flow-control clamp below filter chamber to just below chamber; close

I. Remove protective cover from spike port of normal saline solution

(NOTE: When using a glass bottle, place it on a firm surface. When using a plastic bag, hang it from the IV pole.)

J. Cleanse spike port of glass bottle thoroughly with alcohol sponge

K. Remove protective cap from the spike of the Y-tubing

(NOTE: Check directions on packaging of administration set with regard to proper spike for blood versus IV solution)

(CAUTION: Carefully avoid touch contamination.)

L. Spike normal saline container

M. Hang glass bottle from IV pole

JOB SHEET #3

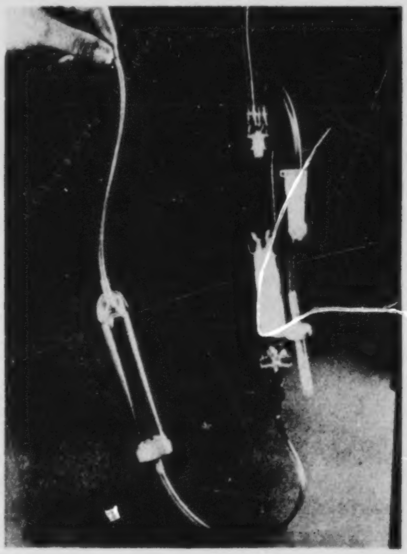
N. Open flow-control clamp just below normal saline

O. Squeeze chamber above filter and fill chamber so that saline completely covers filter

(CAUTION: Never squeeze the filter as this could damage it.)

P. Invert the pump chamber (Figure 3)

FIGURE 3



Q. Open main flow-control clamp

R. Fill pump chamber while it is inverted

S. Fill rest of tubing; then close both clamps

T. Perform venipuncture or connect tubing to existing venipuncture and establish flow

U. Obtain blood or blood product

V. Identify patient with blood, using proper procedure

W. Remove protective cap from unused spike of Y-tubing

(CAUTION: Carefully avoid touch contamination.)

X. Hold blood or blood product container with spike port up

Y. Pull apart plastic tabs covering spike port of blood or blood product

JOB SHEET #3

Z. Insert tubing spike into opened blood or blood product spike port with a twisting motion

(CAUTION: Take great care not to pierce the side of the bag.)

AA. Gently rotate whole blood, packed cells, or platelets

BB. Hang blood or blood product container from IV pole

(NOTE: Always connect Y-type tubing with pump directly into venous needle or catheter.)

CC. Close clamp below saline IV solution

(NOTE: If saline clamp is opened, the saline and blood or blood product will mix.)

DD. Begin infusion by opening clamp just below blood or blood product

EE. Adjust main flow-control clamp to prescribed flow rate; leave flow-control clamp below normal saline closed

(CAUTION: Blood tubing should never hang over four hours between units. Never infuse over two units through one tubing, due to the great threat of bacterial contamination.)

FF. Wash hands before leaving room

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #4--FILL MICROAGGREGATE FILTER

I. Equipment and materials

A. Normal saline IV solution

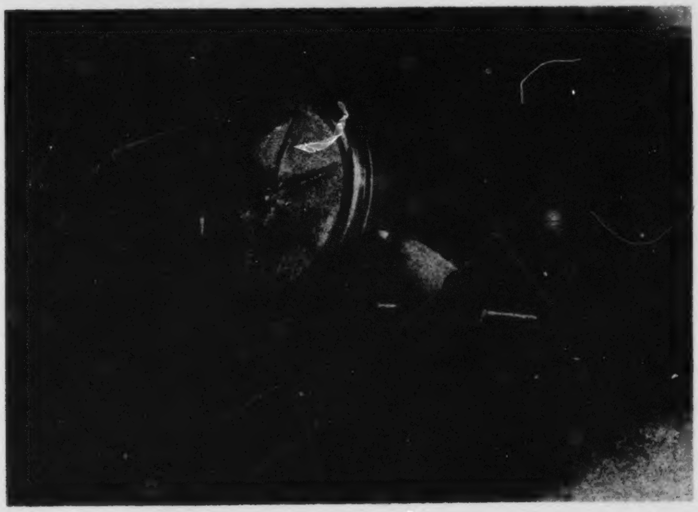
B. Prescribed blood or blood product

C. Y-type blood tubing with or without pump

(NOTE: Most blood and blood products come in plastic bags today and do not require a vented tubing, but if using a nonvented glass bottle of normal saline, a vented tubing will be required.)

D. Microaggregate filter (Figure 4)

FIGURE 4



E. Alcohol sponge

II. Procedure

A. Identify patient's need for blood or blood products by using appropriate communication tool

B. Obtain IV solution and equipment and take to room

C. Follow proper procedure for patient identification

D. Identify yourself to patient and/or family and explain procedure

JOB SHEET #4

E. Wash hands

F. Open tubing packaging and remove tubing

G. Move up flow-control clamps on upper Y-tubings to approximately half way between spikes and filter chamber; close both

H. Move up main flow-control clamp below filter chamber to just below the chamber; close

I. Remove protective covering from spike port of normal saline

(NOTE: When using a glass bottle, place it on a firm surface. When using a plastic bag, hang it from the IV pole.)

J. Cleanse spike port of glass bottle with alcohol sponge

K. Remove protective cap from spike of Y-tubing

(NOTE: Check directions on packaging of administration set with regard to proper spike for blood versus IV solution.)

(CAUTION: Carefully avoid touch contamination.)

L. Spike normal saline container

M. Hang glass bottle from IV pole

N. Open flow-control clamp below normal saline

O. Squeeze chamber above filter and fill chamber so that saline completely covers filter

(CAUTION: Never squeeze the filter as this could damage it.)

P. Fill rest of tubing; then close both clamps

Q. Obtain blood or blood product

R. Identify patient with blood, using proper procedure

S. Remove microaggregate filter from packaging

T. Remove protective covering from unused spike of Y-tubing

(CAUTION: Carefully avoid touch contamination.)

JOB SHEET #4

U. Remove protective covering from short spike on bottom of microaggregate filter

(CAUTION: Carefully avoid touch contamination.)

V. Insert tubing spike into female adapter of filter

(CAUTION: Care must be taken to avoid pushing the spike in too hard. It can split the female adapter of the filter.)

W. Open flow-control clamp below microaggregate filter

X. After filter is filled, close flow-control clamp below microaggregate filter

Y. Remove protective cap from long, top spike of microaggregate filter

(CAUTION: Carefully avoid touch contamination.)

Z. Hold blood or blood product container with spike port up

AA. Pull apart plastic tabs covering spike port of blood or blood product

BB. Insert filter spike into opened blood or blood product spike port with a twisting motion

(CAUTION: Take great care to not pierce the side of the bag.)

CC. Gently rotate whole blood, packed cells, or platelets

DD. Hang blood or blood product container from IV pole

(NOTE: The blood or blood product can now be piggybacked by large-gauge needle into existing line after the line is flushed with normal saline below secondary port. This type of setup is usually connected directly into the needle or catheter. Obtain and know your hospital's policy.)

EE. Begin infusion by opening clamp just below blood or blood product

FF. Adjust main flow-control clamp to prescribed flow rate; leave flow-control clamp below normal saline closed

(NOTE: If saline clamp is opened, the saline and blood or blood product will mix.)

(CAUTION: These filters and tubings should never hang over four hours between units. Never infuse over two units through one tubing and filter, due to the great threat of bacterial contamination.)

GG. Wash hands before leaving room

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #5--OBTAIN UNIT OF BLOOD FROM BLOOD BANK

I. Equipment and and materials

   A. Requisition form

   B. Patient's chart--admission information sheet (summary sheet)

   C. Pen

II. Procedure

   (NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

   A. Fill out front of requisition using information from patient's chart

   B. Take requisition to blood bank

   C. Check the following items with blood bank technician

      (NOTE: If technologist is not available, two nurses must obtain and check the unit of blood.)

      1. ABO type

      2. Rh type

      3. Donor number

      4. Compatibility

      5. Patient blood bracelet identification number, if applicable

      6. Expiration date

         (NOTE: These items will be on the unit of blood and requisition form attached to the unit.)

      7. Patient's name

      8. Patient's hospital number

         (NOTE: These items will be found on the requisition form attached to the unit and the requisition form you take to the blood bank.)

   D. Record this information on the proper forms at blood bank

   E. Take unit of blood to the nursing unit

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #6--OBTAIN UNIT OF WHITE BLOOD CELLS, PLASMA, OR PLATELETS FROM BLOOD BANK

I. Equipment and materials

- A. Requisition form
- B. Patient's chart--admission information sheet (summary sheet)
- C. Pen

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

- A. Fill out requisition form using information from patient's chart
- B. Take requisition to blood bank
- C. Check the following items with blood bank technician

  (NOTE: These items will appear both on the unit and the requisition form.)

  1. ABO type
  2. Unit number
  3. Donor number
  4. Expiration date

     (NOTE: The ABO type will not appear on the unit if it is red-cell free.)

- D. Record this information on the proper forms at blood bank
- E. Take blood product to the nursing unit

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #7--IDENTIFY UNIT OF BLOOD WITH PATIENT

I. Equipment and materials

- A. Patient's chart
- B. Prescribed blood product
- C. Hospital identification bracelet on patient's arm
- D. Blood identification bracelet on patient's arm if applicable

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

- A. Verify communication tool with doctor's original order
- B. Check the following items with another nurse

  (NOTE: These items will appear on the unit and/or requisition attached to the unit and/or the admission information sheet.)

  1. Patient's full name
  2. Hospital number
  3. ABO type
  4. Rh type
  5. Donor number
  6. Compatibility
  7. Expiration date
- C. Fill in proper spaces on requisition form
- D. Sign form (both nurses' signatures required)
- E. Take unit of blood to bedside
- F. Identify yourself to patient and/or family and explain procedure
- G. Identify patient
- H. Compare hospital number on requisition form attached to unit to hospital number on hospital identification bracelet on patient's arm
- I. Check the number on the unit of blood with the blood identification bracelet on patient's arm, if applicable

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #8--IDENTIFY UNIT OF WHITE BLOOD CELLS, PLASMA, OR PLATELETS WITH PATIENT

I. Equipment and materials

  A. Prescribed blood product

  B. Hospital identification bracelet on patient's arm

II. Procedure

  (NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

  A. Verify patient's need for the product by checking doctor's original order

  B. Check these items with another nurse

    (NOTE: These items will appear on the unit and the requisition form attached to the unit.)

    1. ABO type

    2. Unit number

    3. Donor number

    4. Expiration date

      (NOTE: The ABO type will not appear on the unit if it is red-cell free.)

  C. Fill in proper spaces on requisition form

  D. Take unit to bedside

  E. Identify yourself to patient and/or family and explain procedure

  F. Identify patient

  G. Compare hospital number on requisition form attached to unit to hospital number on identification bracelet on patient's arm

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #9--TRANSFUSE WHOLE BLOOD OR PACKED RED CELLS

I. Equipment and materials

A. Appropriate communication tool

EXAMPLE: IV board and/or medication card and/or Kardex

B. Patient's chart

C. Appropriate requisition forms

D. Blood administration tubing

E. Normal saline IV solution

F. Thermometer

G. Sphygmomanometer and stethoscope

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

(CAUTION: Never become blase about blood transfusions! Always remember that this is not a simple procedure and the patient's very life may depend on your knowledge and accuracy in following all policies and procedures.)

A. Identify patient's need for blood by using appropriate communication tool

B. Verify communication tool with doctor's original order

C. Obtain and fill out appropriate requisition forms; send to laboratory

(NOTE: It will take at least one to two hours for the laboratory to draw the blood and then do the type and crossmatch.)

D. Identify patient

E. Identify yourself to patient

F. Obtain nursing history to include previous transfusion reaction and/or possible disease states

G. Explain need for blood

(NOTE: Do not minimize the procedure, but reassure the patient and family.)

JOB SHEET #9

H. Answer any questions and correct any misconceptions to elicit patient understanding

I. Wash hands

J. Choose proper administration set and fill properly using normal saline

K. Perform venipuncture and/or have a patent IV needle or catheter in place before you obtain the product

(NOTE: A unit of blood or packed cells can remain out of the blood bank for *only* twenty to thirty minutes before the blood bank will not accept its return.)

(CAUTION: Never place a unit of blood in the medication or food refrigerator on your unit: The temperature for proper storage of blood is 41'F, and there is no allowance.)

L. Obtain unit of blood or packed cells from blood bank

(NOTE: This procedure will vary from hospital to hospital. Some hospitals require you to obtain the unit from the blood bank and others require the shift supervisor to obtain the unit. Obtain and know your hospital's procedure.)

M. Follow *exactly* the correct procedure for identification of unit of blood and identification of patient with unit of blood

N. Obtain full vital signs

(NOTE: Vital signs must include temperature)

O. Hang unit of blood, using proper administration set and IV solution

P. Monitor blood pressure, pulse, and respirations every fifteen minutes during first hour of transfusion

(NOTE: Each hospital has a policy and procedure with regard to blood transfusions. You *must* obtain and know these.)

Q. Keep patient warm

R. Stay with patient during first ten to twenty minutes of transfusion to monitor for signs of transfusion reaction

(NOTE: The symptoms of most reactions occur during this time.)

S. Enlist patient's and family's help and cooperation with these instructions

1. Do not tamper with any part of the tubing
2. Call nurse if infusion slows or stops
3. Call nurse if insertion site begins to burn or hurt

JOB SHEET #9

4. Call nurse if any shivering, headache, tightness in chest, or itching occurs

5. Call nurse if any difficulty breathing occurs

   (NOTE: Of course there will be some patients who will call and complain of all of the above, but it is better to have this happen than to have a reaction occur that you do not catch immediately.)

T. Take temperature at mid-point of transfusion

U. Monitor flow rate frequently

(NOTE: Blood transfusions are notorious for slowing down to a limited flow, or even stopping, due to the viscosity of the product.)

V. Adjust rate if flow rate slows or stops

1. Check flow-control clamp and open further if necessary

2. Check for kinks or crimps in tubing

3. Check the filter; if clogged, tubing may need to be changed

4. Rotate bag gently to mix cells and plasma

5. Squeeze flashback if present on tubing

   EXAMPLE: Travenol tubing

6. Pinch tubing about 12 inches above insertion site and milk tubing toward site

7. Raise height of bag

8. Irrigate tubing and venous needle or catheter using syringe and normal saline if the above steps are not adequate to ensure flow of blood

   (CAUTION: You must be absolutely certain that the IV is not infiltrated before using the syringe and normal saline.)

W. Infuse within proper time limit

X. Obtain full vital signs after transfusion is complete

(NOTE: Vital signs must include temperature.)

Y. Wash hands before leaving room

Z. Return empty blood bag to laboratory

JOB SHEET #9

AA. Document carefully your explanations, patient's understanding of explanation, and all of your actions and assessments on appropriate chart forms

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #10--TRANSFUSE WHITE BLOOD CELLS

I. Equipment and materials

A. Appropriate communication tool

EXAMPLE: IV board and/or medication card and/or Kardex

B. Patient's chart

(NOTE: You will need the doctor's order sheet.)

C. Appropriate requisition forms

E. Blood administration tubing

F. IV solution

(NOTE: If the white cells are red-cell free, D_5W can be used. If they are not red-cell free, normal saline must be used.)

G. Thermometer

H. Sphygmomanometer and stethoscope

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

(CAUTION: Remember, any patient requiring WBCs is very susceptible to infection and will probably be in reverse isolation.)

A. Identify patient's need for white blood cells by using appropriate communication tool

B. Verify communication tool with doctor's original order

C. Obtain and fill out appropriate requisition forms; send to laboratory

D. Identify patient

E. Identify yourself to patient and/or family

F. Obtain nursing history to include previous transfusion reaction and/or possible disease states

G. Explain need for WBCs and possibility of untoward reactions

(NOTE: Do not minimize the procedure, but reassure patient and family. Assure them that any reactions are temporary.)

JOB SHEET #10

H. Answer any questions and correct any misconceptions to elicit patient understanding

I. Wash hands

J. Choose proper administration set and fill properly using normal saline

(NOTE: Administration set can be used when venipuncture is performed. If venous needle or catheter is in place have set ready.)

K. Perform venipuncture and/or have a patent venous needle or catheter in place before you obtain the product

(NOTE: The infusion must be completed within two hours of obtaining unit.)

L. Follow correct procedure for identifying WBCs and patient

(NOTE: This procedure is outlined in Job Sheet #3.)

M. Obtain full vital signs before beginning infusion

(NOTE: Vital signs must include temperature.)

N. Hang unit of WBCs using proper administration set and IV solution

O. Monitor the blood pressure, pulse, and respirations every fifteen minutes during infusion

P. Keep patient warm

Q. Have family stay with patient if possible

R. Enlist patient's and family's help and cooperation with these instructions

1. Do not tamper with any part of tubing
2. Call nurse if any chills or shivering occur
3. Call nurse if any mental changes are noted
4. Call nurse if flow rate slows or stops

S. Monitor flow rate frequently

T. Report hypertension to physician

(NOTE: The hypertension is usually mild and of short duration.)

U. Reassure patient and family if untoward reactions occur

V. Complete infusion within two hours

W. Flush tubing with IV solution

(NOTE: Flushing ensures that all the white cells enter the patient's circulation.)

JOB SHEET #10

X. Obtain temperature at end of infusion

Y. Obtain temperature every four hours for twenty-four hours

Z. Wash hands before leaving room

AA. Return empty WBC bag to laboratory

BB. Document carefully your explanations, patient's understanding of explanation, and all of your actions and assessments on appropriate chart forms

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #11--TRANSFUSE PLASMA

I. Equipment and materials

A. Appropriate communication tool

EXAMPLE: IV board and/or medication card and/or Kardex

B. Patient's chart

(NOTE: You will need the doctor's order sheet.)

C. Appropriate requisition forms

D. Blood administration tubing

E. IV solution

(NOTE: If the white cells are red-cell free, D_5W can be used. If they are not red-cell free, normal saline must be used.)

F. Thermometer

G. Sphygmomanometer and stethoscope

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

A. Identify patient's need for plasma by using appropriate communication tool

B. Verify communication tool with doctor's original order

C. Obtain and fill out appropriate requisition forms; send to laboratory

D. Notify laboratory as soon as requistion is sent

(NOTE: It takes thirty minutes to thaw a unit of frozen plasma.)

E. Identify patient

F. Identify yourself to patient and/or family

G. Obtain nursing history to include previous transfusion reaction and/or possible disease states

H. Explain need for plasma

(NOTE: Plasma is an opaque yellowish color, and to someone who has never seen it, it would look odd.)

JOB SHEET #11

I. Answer any questions, correct any misconceptions, and elicit patient's understanding

J. Wash hands

K. Choose proper administration set and fill properly using correct IV solution

(NOTE: Administration set can be used when venipuncture is performed. If venous needle and/or catheter is in place have set ready.)

L. Perform venipuncture and/or have a patent venous needle or catheter in place before you obtain the product

(NOTE: The infusion must be completed within two hours of obtaining unit.)

M. Follow correct procedure for identifying plasma and patient

N. Obtain full vital signs before beginning infusion

O. Hang unit of plasma, using proper administration set and IV solution

P. Monitor vital signs as required by patient's condition

(NOTE: Patients receiving plasma are frequently unstable hemodynamically and require frequent monitoring of blood pressure, pulse, and respirations.)

Q. Monitor for signs of fluid overload

R. Enlist patient and family's help and cooperation with these instructions

1. Do not tamper with any part of tubing
2. Call nurse if breathing difficulty occurs
3. Call nurse if flow rate slows or stops

S. Monitor flow rate frequently

T. Complete infusion within two hours

U. Wash hands before leaving room

V. Return empty plasma bag to laboratory

W. Document carefully your explanations, patient's understanding of explanation, and all of your actions and assessments on appropriate chart forms

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #12--TRANSFUSE PLATELETS

I. Equipment and materials

A. Appropriate communication tool

EXAMPLE: IV board and/or medication card and/or Kardex

B. Patient's chart

(NOTE: You will need the doctor's order sheet.)

C. Appropriate requisiton forms

D. IV tubing *without* filter

E. IV solution

(NOTE: Use 250 milliliters D_5W solution if platelets are red-cell free; use 250 milliliters normal saline solution if platelets are not red-cell free.)

F. Thermometer

G. Sphygmomanometer and stethoscope

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and return demonstration by the student must be performed in the actual clinical setting.)

A. Identify patient's need for platelets by using appropriate communication tool

B. Verify communication tool with doctor's original order

C. Obtain and fill out appropriate requisition forms; send to laboratory

D. Identify patient

E. Identify yourself to patient and/or family

F. Obtain nursing history to include previous transfusion reaction and/or possible disease states

G. Explain need for platelets and possibility of allergic-type reaction

(NOTE: The platelets are suspended in plasma and are an odd-looking opaque, yellowish color. Do not minimize the allergic reaction, but tell patient that if it occurs, it will be treated and is not life-threatening.)

JOB SHEET #12

H. Answer any questions and correct any misconceptions to elicit patient's understanding

I. Wash hands

J. Choose proper IV tubing and fill properly using correct IV solution

(NOTE: Administration set can be used when venipuncture is done. If venous needle or catheter is in place have set ready.)

K. Perform venipuncture and/or have venous needle or catheter in place before you obtain the product

(NOTE: The infusion must be given as rapidly as possible after obtaining the product.)

L. Follow correct procedure for identifying platelets and patient

M. Obtain full vital signs before beginning infusion

N. Remove IV solution from IV tubing, and connect and hang platelets

O. Monitor vital signs as required by patient's condition

(NOTE: These patients may be actively bleeding and thus be very unstable hemodynamically. They may require frequent monitoring of vital signs.)

P. Stay with patient during infusion

Q. Infuse as rapidly as possible

(NOTE: If there is great concern about fluid overload, you may have to infuse over a longer period of time, such as thirty minutes.)

R. Agitate container at least every five minutes during infusion

S. Monitor for signs of allergic reaction or fluid overload

T. Report allergic reaction and/or fluid overload to physician

U. Reassure patient and family if untoward reaction occurs

V. Administer ordered drugs promptly

EXAMPLES: Antihistamines, Lasix

W. Flush tubing with IV solution after platelet container is empty

(NOTE: Flushing ensures that all of the platelets enter the patient's circulation.)

X. Wash hands before leaving room

JOB SHEET #12

Y. Return empty platelet bag to laboratory

Z. Document carefully your explanations, patient's understanding of explanation, and all of your actions and assessments on appropriate chart forms

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #13--ADMINISTER PLASMA PROTEIN FRACTION OR ALBUMIN

I. Equipment and equipment

A. Appropriate communication tool

EXAMPLE: IV board and/or medication card and/or Kardex

B. Patient's chart

(NOTE: You will need the doctor's order sheet.)

C. Plasma protein fraction or albumin

(NOTE: These products are obtained from the pharmacy.)

D. Blood pressure apparatus including stethoscope

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and a return demonstration by the sudent must be performed in the actual clinical setting.)

A. Identify patient's need for plasma protein fraction or albumin by using appropriate communication tool

B. Verify communication tool with doctor's original order

C. Obtain product from pharmacy

(NOTE: Albumin is often ordered as *Give SPA 25 gm.* This type of albumin comes in 12.5 grams per vial, so two vials would be given.)

D. Identify patient

E. Identify yourself to patient and/or family

F. Obtain nursing history to include previous transfusion reaction and/or possible disease states

G. Explain need for product

(NOTE: Plasma protein fraction and albumin are odd-looking thick, sticky, yellowish liquids.)

H. Answer any questions and correct any misconceptions to elicit patient's understanding

I. Wash hands

JOB SHEET #13

J. Perform venipuncture and/or have a patent venous needle or catheter in place

(NOTE: If the main IV solution is an amino-acid solution, another line will be required or the line below these products will have to be flushed with normal saline.)

K. Set up administration set properly

(NOTE: This set comes with the product. Occasionally the air vent on the set will become wet by the product and the solution will not run. Remove the filter cap and shake the solution out. If this does not work, a needle airway may have to be inserted into the container to vent it.)

L. Obtain blood pressure, pulse, and respirations before beginning infusion

M. Hang product by piggyback into a secondary port; begin infusion

(NOTE: If an amino-acid IV solution is hanging, flush the tubing below this secondary port with normal saline.)

N. Monitor vital signs as required by patient's condition

(NOTE: These patients may be hypovolemic or in shock and require frequent monitoring of vital signs.)

O. Monitor for signs of fluid overload

P. Enlist patient's and family's help and cooperation with these instructions

1. Do not tamper with any part of tubing
2. Call nurse if any breathing difficulty occurs
3. Call nurse if flow slows or stops

Q. Monitor flow rate frequently

R. Flush IV line after infusion

S. Remove albumin tubing from main IV line after infusion is complete

T. Discard used equipment in appropriate place

U. Wash hands before leaving room

V. Document carefully your explanations, patient's understanding of explanation, and all of your actions and assessments on the appropriate chart forms

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

JOB SHEET #14--ADMINISTER CLOTTING FACTORS 8 AND 9

I. Equipment and materials

A. Appropriate communication tool

EXAMPLE: IV board and/or medication card and/or Kardex

B. Patient's chart

(NOTE: You will need the doctor's order sheet.)

C. Venipuncture equipment

(NOTE: This equipment will be required only if there is no existing IV line or if a second IV line is required.)

1. 20- or 22-gauge ONC or 21- or 23-gauge wing-tipped needle
2. Plastic 50 ml syringe with 20- or 23-gauge needle

   (NOTE: Syringe is used if Factor 8 is given IV push.)
3. Betadine and alcohol prep sponges
4. Antimicrobial ointment
5. Gauze 2x2s, 1 package
6. Tape, 1/2-inch and 1-inch wide
7. D_5W or normal saline IV solution, 250 ml

   (NOTE: Items 1, 4, 5, 6, and 7 will be required if a long-term IV line is to be established.)
8. Tourniquet

D. Prescribed clotting factor

(NOTE: These products are obtained from the pharmacy.)

II. Procedure

(NOTE: The demonstration of this procedure by the instructor and a return demonstration by the student must be performed in the actual clinical setting.)

A. Identify patient's need for clotting factor by using appropriate communication tool

B. Verify communication tool with doctor's original order

C. Identify patient

JOB SHEET #14

D. Identify yourself to patient and/or family

E. Obtain nursing history to include bleeding tendencies, transfusion reaction, and/or possible disease states

F. Explain need for product

G. Answer any questions and correct any misconceptions to elicit patient's understanding

H. Wash hands

I. Perform venipuncture and/or have a patent venous needle or catheter in place if product is to be given piggyback

J. Reconstitute medication powder with accompanying diluent

(CAUTION: Read the manufacturer's instructions very closely before reconstitution, and then follow them exactly. These products are very expensive and can be ruined if reconstituted in a wrong manner.)

K. Set up administration set properly if to be given piggyback; hang product and piggyback by needle into a secondary port

(NOTE: An administration tubing often comes with the product.)

L. Perform straight-stick venipuncture if giving product by IV push; follow correct length of injection

M. Draw back on syringe frequently to assure placement of needle in vein if giving by IV push

N. Monitor vital signs as required by patient's condition

(NOTE: The patient will frequently be actively bleeding and will require frequent monitoring of vital signs.)

O. Enlist patient's and family's help and cooperation with these instructions

1. Do not tamper with any part of the tubing
2. Call nurse if flow rate slows or stops

P. Monitor flow rate frequently

Q. Complete infusion within one hour

R. If given by piggyback, remove from line after infusion is complete

S. Discard used equipment in appropriate place

T. Wash hands before leaving room

JOB SHEET #14

U. Document your explanations, patient's understanding of explanation, and all of your actions and assessments on the appropriate chart forms

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

TEST

NAME ______________________________ SCORE ______________

1. Match to their correct definitions terms associated with blood and blood products. Write the correct numbers in the blanks.

______a. To rapidly freeze a substance at an extremely low temperature and then dehydrate that substance in a vacuum

______b. Evaluation

______c. Disintigration and destruction of red blood cells

______d. Tendency of fluids to pass through a semi-permeable membrane to equalize concentrations on both sides of the membrane

______e. Gelatinous substance made of insoluble particles larger than molecules but small enough to remain suspended in a fluid

______f. Small roundish disc, found in blood and associated with blood clotting

______g. To hold or keep particles in a liquid in suspension; to hang

______h. Abnormal reduction of one type of white cells

______i. Movement of a container so that the contents are mixed

______j. Act of bringing back to a former or normal state

______k. Low circulating volume of fluid

______l. Any matter that settles to the bottom of a liquid

______m. Low body protein

______n. Combination of parts to make a whole

______o. Disintegration of fibrin, the protein that promotes clotting

______p. Capable of stopping the flow of blood

1. Hypovolemia
2. Colloid
3. Osmosis
4. Agitate
5. Suspend
6. Fibrinolysis
7. Granulocytopenia
8. Hemolysis
9. Synthesis
10. Hypoproteinemia
11. Restoration
12. Hemostatic
13. Platelet
14. Sediment
15. Assessment
16. Lyophilize

TEST

2. Write abbreviations used for key words used with blood, blood products, and volume expanders.

_____________a. Blood pressure

_____________b. Carbon dioxide

_____________c. Hematocrit

_____________d. Hemoglobin

_____________e. Human leukocyte group A antigen

_____________f. Pulse

_____________g. Respirations

_____________h. Temperature

_____________i. Vital signs

_____________j. Immunoglobulin gamma A

_____________k. Letters denoting blood group types

_____________l. Red blood cells

_____________m. White blood cells

3. Select from the following list functions of blood. Write an "X" in the blank before each correct answer.

_____a. Helps regulate and equalize body temperature

_____b. Makes medications work

_____c. Carries essentials for tissue synthesis and energy

_____d. Provides a defense against infection

_____e. Utilizes ingested protein and fat

_____f. Carries lymph fluid between lymph nodes

_____g. Maintains clotting factors

_____h. Provides hormones for body functions

_____i. Helps regulate body fluids and electrolyte content

_____j. Removes waste products from cells

TEST

_____k. Carries impulses for sensory input

_____l. Helps manufacture blood cells

_____m. Supplies oxygen and nutrients for tissue maintenance, growth, and repair

_____n. Helps maintain tissue acid/base balance

_____o. Transports cellular wastes to elimination organs

4. List the components of blood.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

TEST

5. State information related to blood and blood products by completing the following chart.

Blood/Blood Products	Use(s)	Volume	Typing/ Crossmatching	Filter	Storage
Platelets	Restoring adequate numbers of platelets; treating suspected or confirmed bleeding disorders	30 to 50 milliliters per unit	ABO typing preferred	a.______ ______	b.______ ______
c.______	Replacing RBCs when volume does not need to be restored	d.______ ______ ______	e.______	Yes	Up to twenty-one days at 41°F
Whole blood	f.______ ______	500 milliliters per unit	Yes	Yes	g.______ ______
h.______ ______	Treating hypovolemic shock, hyporproteinemia, dehydration with electrolyte deficiencies in children; volume expander	250 to 500 milliters per unit	i.______	j.______	Up to three years at room temperature; up to five years when refrigerated
Factor 9	k.______ ______ ______ ______ ______	50 milliliters per vial	No	No	l.______ ______ ______
m.______	Treating hypoproteinemia; helping to maintain electrolyte balance; preventing marked hemoconcentration; as a volume expander to treat shock syndromes	n.______ ______ ______ ______ ______ ______ ______ ______	No	No	o.______ ______ ______ ______

TEST

Blood/Blood Products	Use(s)	Volume	Typing/ Crossmatching	Filter	Storage
Factor 8	p.____________ ____________	q.____________ ____________	No	No	Up to one year; must be refrigerated
Plasma	r.____________ ____________ ____________ ____________ ____________ ____________ ____________ ____________	s.____________ ____________	ABO typing preferred	Yes	Up to twelve months if frozen; up to six hours if fresh
White blood cells	Treating life-threatening granulocytopenia	150 to 250 milliliters per unit	t.____________	Yes	u.____________ ____________ ____________

TEST

6. Distinguish among infusion guidelines for blood and blood products. Write the correct numbers in the blanks. A blank may contain more than one answer.

_____a. Use blood administration set and large-gauge venous needle or catheter (16- or 18-gauge ONC or 19-gauge wing-tipped needle); do not allow infusion time to exceed four hours; infuse *only* with normal saline IV solution; use extreme care if using infusion pump

_____b. Infuse with moderate-gauge venous needle or catheter (18- to 23-gauge); infuse as rapidly as possible; can be given by IV push; can be piggybacked into an existing line by straight-line IV tubing; avoid use of infusion pump; infuse with any IV solution if platelets are completely red-cell free; flush administration line with normal saline (if not red-cell free) or D_5W (if red-cell free) after completion of infusion; monitor for allergic reactions

_____c. Infuse with any size venous needle or catheter; can be administered by IV push or intermittent infusion; can be infused with most IV solutions; can be piggybacked into an existing line; avoid use of infusion pump; complete infusion within one hour after diluent is added to powder; flush administration line with IV solution after completion of prescribed dose

_____d. Use blood administration set and large-gauge venous needle or catheter (16- or 18-gauge ONC or 19-gauge wing-tipped needle); do not allow infusion time to exceed four hours; infuse *only* with normal saline IV solution; use extreme care if using an infusion pump; monitor for fluid overload

_____e. Use blood administration set and moderate-gauge venous needle or catheter (18- to 20-gauge); do not allow infusion time to exceed two hours; infuse with any IV solution that is completely red-cell free; monitor for development of untoward reactions

_____f. Infuse with any size venous needle or catheter; infuse at a rate depending on patient's condition and response; can be infused with most IV solutions; can be piggybacked into an existing line with a large-gauge needle; may not be possible to use infusion pump

1. Whole blood
2. Red blood cells
3. White blood cells
4. Platelets
5. Plasma
6. Plasma protein fraction
7. Albumin
8. Factor 8
9. Factor 9

TEST

_____g. Use blood administration set and moderate-gauge venous needle or catheter (18- to 20-gauge); infuse with any IV solution if plasma is completely red-cell free; may not be possible to use infusion pump; infuse thawed frozen plasma within two hours; infuse fresh drawn plasma within six hours

_____h. Infuse with any size venous needle or catheter; can be administered by IV push or intermittent infusion; infuse at a rate comfortable to patient; can be infused with most IV solutions; can be piggybacked into existing line; avoid use of infusion pump; complete infusion within six hours after diluent is added to powder; flush administration line with IV solution after completion of prescribed dose

7. Arrange in order steps to follow for infusion of blood and blood products. Write a "1" before the first step, a "2" before the second step, and so on. This question continues on the next page.

_____a. Perform venipuncture

_____b. Warm blood if multiple successive units are to be given

_____c. Make sure that any required laboratory tests are ordered, completed, and reported

_____d. Obtain nursing history to include previous transfusion reaction and/or possible disease states

_____e. Fill out forms properly

_____f. Know signs and symptoms of reactions

_____g. Chart blood or blood product on proper chart form

_____h. Monitor patient for signs of complications and/or reactions

_____i. Administer IV medications through an alternate site and line, *never* through the site and line being used for blood or blood product

_____j. Choose proper administration set

_____k. Infuse within proper length of time

_____l. Obtain vital signs as specified for each product

_____m. Discontinue IV *immediately* if infiltration occurs

_____n. Identify blood or blood product with the patient

TEST

_____ o. Document carefully all of your assessments, observations, and actions on proper chart form

_____ p. Fill blood administration set properly with IV solution

_____ q. Monitor IV site carefully for signs of infiltration

_____ r. Choose microaggregate filter, if needed, and fill properly

_____ s. Restart IV immediately, using other arm if possible

_____ t. Obtain product from blood bank

_____ u. Check doctor's original order to confirm need for product

8. Match to their correct definitions terms associated with hazards of transfusing blood and blood products. Write the correct numbers in the blanks.

_____ a. Abnormal susceptibility to a substance

_____ b. To find out with certainty

_____ c. Not capable of uniting

_____ d. Vascular reaction of skin characterized by eruptions of pale, short-lived wheals associated with severe itching; hives

_____ e. Fatty carbohydrates

_____ f. Anything that reduces fever

_____ g. Allergy causing

_____ h. Response of an organism to a stimulus

_____ i. Farthest from point of attachment

_____ j. Abnormal breath sound heard when listening to the chest

_____ k. Not opposed to

_____ l. Severe itching of the skin

_____ m. Free from disease-producing microorganisms

1. Atopic
2. Compatible
3. Incompatible
4. Lipopolysaccharides
5. Reaction
6. Pruritis
7. Urticaria
8. Aseptic
9. Rale
10. Ascertain
11. Distal
12. Antipyretic
13. Sensitivity

TEST

9. Identify hazards associated with blood and blood products. Write the correct names in the blanks.

Hazard	Occurrence	Cause	Prevention	Signs/symptoms
a._______________ ________________	Common; can be serious	Presence of transmissible disease in blood	Carefully screened blood donors	Vary according to disease transmitted; do not show up immediately
b._______________ ________________	Common; not serious	Bacterial lipopolysaccharides in blood	Strict aseptic technique when blood is drawn and transfused Use of saline-washed red cells or frozen saline-washed red cells if history is positive for febrile reactions	Mild to severe chills and fever; extreme symptoms resemble a hemolytic reaction
c._______________ ________________	Uncommon but serious; may be fatal	IgA incompatibility	Crossmatching for IgA incompatibility	Facial flushing, abdominal pain, diarrhea, chills, fever, dyspnea, decreased blood pressure
d._______________ ________________	Uncommon; may be fatal	Incompatibility of the ABO or Rh type	Careful typing, crossmatching, labeling, and identification	Chills; fever; low back pain; chest pain and/or tightness; dyspnea; decreased blood pressure; nausea and/or vomiting; bleeding abnormalities such as oozing from venipuncture site, blood in urine, bleeding from gums
e._______________ ________________	Common; serious but usually treatable	Giving too large amount of blood or blood product too quickly for patient's hemodynamic status	Use of packed red cells if possible; identification of high risk patients	Increased respiratory rate without apparent cause, dry hacky cough, dyspnea, neck vein distention, increased pulse rate without apparent cause, rales
f._______________ ________________	Common; not serious	Atopic substance in blood		Pruritis, urticaria, facial swelling, chills, fever, nausea and/or vomiting

TEST

Hazard	Occurrence	Cause	Prevention	Signs/symptoms
g.________________	Uncommon; serious; may be fatal	Gram negative bacteria in blood	Use of air-free, touch-free methods to draw blood; maintaining strict storage control; strict adherence to aseptic administration technique	Chills, fever, vomiting, diarrhea, decreased blood pressure, vascular collapse, shock

TEST

10. Match specific hazards of transfusing blood and blood products to correct nursing responsibilities and interventions. Write the correct numbers in the blanks. Numbers may be used more than once. Blanks may contain more than one answer.

__________a. Have another nurse stay with patient and monitor vital signs

__________b. Position patient comfortably

__________c. Administer drugs, oxygen, and fluids promptly as ordered

__________d. Begin transfusion slowly

__________e. Stay with patient during first ten to twenty minutes of transfusion

__________f. Give blood as a voluntary donor

__________g. Use strict aseptic technique throughout all procedures

__________h. Notify doctor

__________i. Encourage good voluntary donor program

__________j. Document carefully all your assessments, observations, and actions on proper chart forms

__________k. Never allow a tubing and/or filter to hang over four hours between units

__________l. Remove blood and tubing immediately when reaction is suspected, but keep vein open by hanging fresh normal saline IV solution and tubing down to needle or catheter

__________m. Follow your hospital's policy and procedure for transfusion reactions

__________n. Use infusion pump if possible

__________o. Never infuse over two units of blood or blood product through one tubing if given continuously

__________p. Turn transfusion off when overload is suspected and keep vein open with normal saline until orders received

1. Hemolytic reaction
2. Febrile reaction
3. Allergic reaction
4. Plasma protein incompatibility
5. Blood contamination
6. Fluid overload
7. Disease transmission

TEST

__________q. Never allow a unit of blood to hang over four hours

__________r. Obtain and fill out reaction forms

__________s. Keep patient warm

__________t. Administer ordered antipyretic medications promptly

__________u. Monitor vital signs, including temperature and urine output, as indicated by patient's condition

__________v. Administer any ordered drugs promptly

__________w. Reassure patient and family

__________x. Use volume control device for high risk patients

__________y. Administer ordered drugs and treatments promptly

11. Describe volume expanders and their actions.

12. Distinguish among characteristics of each of the two types of biologic volume expanders. Write the correct numbers in the blanks. Numbers may be used more than once. Blanks may contain more than one number.

_____a. Used to treat hypoproteinemia and low circulating volume

_____b. Sensitivity reactions can occur but are rare

1. Normal serum albumin
2. Plasma protein fraction

TEST

______c. 5% solution is osmotically equivalent to blood and will draw an equal volume of fluid into circulating volume

______d. Pasteurized to reduce risk of hepatitis

______e. Solution is a 5 percent concentration of selected proteins from pooled plasma in buffered, stabilized saline

______f. Solution is either 5 percent or 25 percent concentration

______g. 25% solution has five times osmotic pressure of blood and will draw five times its volume of fluid into circulating volume

______h. Osmotically equivalent to blood and will draw an equal volume of fluid into circulating volume

13. Describe how synthetic volume expanders differ from biologic volume expanders.

____

____

____

____

____

14. Select from the following list nursing responsibilities and interventions with regard to volume expanders. Write an "X" in the blank before each correct answer.

______a. Observe for signs of fluid overload

______b. Explain the use of these products to patient and family

______c. Infuse rapidly if hypovolemic

______d. Obtain nursing history with regard to loss of large amounts of fluid and/or existing cardiac or renal problems

______e. Monitor vital signs every fifteen minutes during infusion

______f. Monitor urine output every two hours

______g. Notify laboratory of use of volume expanders

______h. Infuse at rate of 5 milliliters per minute if patient is hypovolemic; reduce rate as blood pressure reaches acceptable level

TEST

______i. Monitor vital signs as indicated

______j. Observe for allergic reactions

______k. Keep patient warm

______l. Observe for bleeding tendencies for twenty-four hours if using synthetic expanders

______m. Infuse with blood or blood product

______n. Document carefully all of your assessments, observations, and actions on the proper chart forms

______o. Infuse at 1 milliliter per minute if given for hypoproteinemia; if you see no signs of fluid overload in fifteen to twenty minutes, increase to 2 milliliters per minute

______p. Observe for sensitivity reactions

(NOTE: Test questions 15-18 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

15. Fill out requisition forms associated with blood and blood products.

16. Calculate flow rates for blood and blood products.

17. Fill out form for reporting a suspected transfusion reaction.

18. Demonstrate the ability to

    a. Fill straight-line blood tubing.

    b. Fill Y-type blood tubing.

    c. Fill Y-type blood tubing containing built-in pump.

    d. Fill microaggregate filter.

    e. Obtain unit of blood from blood bank.

    f. Obtain unit of white blood cells, plasma, or platelets from blood bank.

    g. Identify unit of blood with patient.

    h. Identify unit of white blood cells, plasma, or platelets with patient.

    i. Transfuse whole blood or packed red cells.

TEST

j. Transfuse white blood cells.

k. Transfuse plasma.

l. Transfuse platelets.

m. Administer plasma protein fraction or albumin.

n. Administer clotting factors 8 and 9.

BLOOD, BLOOD PRODUCTS, AND VOLUME EXPANDERS
UNIT XII

ANSWERS TO TEST

1. a. 16
   b. 15
   c. 8
   d. 3
   e. 2
   f. 13
   g. 5
   h. 7
   i. 4
   j. 11
   k. 1
   l. 14
   m. 10
   n. 9
   o. 6
   p. 12

2. a. BP
   b. CO_2
   c. Hct
   d. Hgb
   e. HLA
   f. P
   g. R
   h. T
   i. VS
   j. IgA
   k. ABO
   l. RBC
   m. WBC

3. a, c, d, g, i, j, m, n, o

4. a. Red blood cells
   b. White blood cells
   c. Plasma
   d. Platelets
   e. Proteins
   f. Albumin
   g. Clotting factors

5. a. No
   b. Up to seventy-two hours; must be refrigerated
   c. Red blood cells
   d. 250 to 300 milliliters per unit (varies with amount of plasma removed)

ANSWERS TO TEST

e. Yes

f. Restoring adequate volume

g. Up to twenty-one days at 41°F

h. Plasma protein fraction

i. No

j. No

k. Treating congenital deficiency of this factor to provide hemostatic levels; arresting severe hemorrhaging

l. Each unit has expiration date; must be refrigerated

m. Albumin

n. 250 to 500 milliliters per unit (5% solution); 50 milliliters per unit (25% solution)

o. Up to three years at room temperature; up to five years refrigerated

p. Treating hemophilia A

q. 50 milliliters

r. Treating clotting factor deficiencies, severe hepatic disease, or replacing volume when red cells are not necessary

s. 200 to 250 milliliters per unit

t. ABO typing

u. Usable *only* for twenty-four hours after collection if refrigerated

6. a. 2
   b. 4
   c. 9
   d. 1
   e. 3
   f. 6, 7
   g. 5
   h. 8

7. a. 7
   b. 16
   c. 21
   d. 3
   e. 2
   f. 11
   g. 19
   h. 12
   i. 17

ANSWERS TO TEST

j. 4
k. 18
l. 10
m. 14
n. 9
o. 20
p. 6
q. 13
r. 5
s. 15
t. 8
u. 1

8. a. 13
b. 10
c. 3
d. 7
e. 4
f. 12
g. 1
h. 5
i. 11
j. 9
k. 2
l. 6
m. 8

9. a. Disease transmission
b. Febrile reaction
c. Plasma protein incompatibility
d. Hemolytic reaction
e. Fluid overload
f. Allergic reaction
g. Blood contamination

10. a. 1, 4
b. 3, 6
c. 4
d. 1
e. 1, 2, 3, 4
f. 7
g. 5
h. 1, 2, 3, 4, 5, 6
i. 7
j. 1, 2, 3, 4, 5, 6
k. 5
l. 1, 4, 5
m. 1, 2, 3, 4, 5
n. 6
o. 5
p. 6
q. 5
r. 1, 2, 3, 4, 5
s. 2
t. 2
u. 1, 2, 3, 4, 5, 6
v. 1, 3, 5
w. 1, 2, 3, 4, 5, 6
x. 6
y. 6

ANSWERS TO TEST

11. Description should include the following

    a. Are colloids used to treat low circulating volume

    b. Do not pass through capillary walls into interstitial spaces and cells

    c. Pull fluid from intracellular compartment into circulating volume by osmosis as blood flows through capillary bed from arterial system to venous system

12. a. 1, 2

    b. 1, 2

    c. 1

    d. 2

    e. 2

    f. 1

    g. 1

    h. 2

13. Description should include the following

    a. Are substances manufactured from glucose

    b. Come in two solutions--dextran-70 and dextran-40

    c. Used as an anticoagulant

    d. Used to improve microcirculation

    e. Effects last twenty-four hours

14. a, b, d, g, h, i, l, n, o, p,

15. Evaluated to the satisfaction of the instructor

16. Evaluated to the satisfaction of the instructor

17. Evaluated to the satisfaction of the instructor

18. Performance skills evaluated to the satisfaction of the instructor

SPECIAL CATHETERS
UNIT XIII

UNIT OBJECTIVE

After completing this unit, the student should be able to distinguish among different types of special catheters and perform the nursing care required for each. This knowledge will be shown by completing assignment sheets, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with special catheters to their correct definitions.
2. Identify types of inside-the-needle central venous catheters.
3. Distinguish among complications of insertion and maintenance of inside-the-needle catheters.
4. Select from a list nursing responsibilities and interventions with regard to inside-the-needle catheters.
5. Discuss the Hickman catheter.
6. Select from a list nursing responsibilities and interventions with regard to the Hickman catheter.
7. Analyze a complication associated with central venous catheter.
8. Demonstrate the ability to
    a. Apply temporary dressing over inside-the-needle catheter.
    b. Assist with insertion of inside-the-needle catheter.
    c. Apply dressing after confirmation of placement of inside-the-needle catheter.
    d. Change dressing and care for insertion site for inside-the-needle catheter--technique #1.
    e. Change dressing and care for insertion site for inside-the-needle catheter--technique #2.
    f. Perform daily tubing and filter change on central venous line.
    g. Remove central venous catheter.
    h. Change dressing for peripheral silicone elastomer central venous catheter.

OBJECTIVE SHEET

i. Perform dressing care for Hickman catheter insertion and exit sites.

j. Draw blood through Hickman catheter.

k. Administer medication through Hickman catheter.

SPECIAL CATHETERS
UNIT XIII

SUGGESTED ACTIVITIES

I. Suggested activities

- A. Obtain materials to supplement unit.
  1. Examples of as many special catheters as possible
  2. Polyvinyl inside-the-needle catheter
  3. At least eight gauze 2x2s and 4x4s per student
  4. At least two containers of IV solution for each student
  5. At least two administration sets for each student
  6. At least one dozen cotton-tipped swabs per student

     (NOTE: Cotton-tipped swabs can be used to simulate the prep swabsticks.)
  7. Scissors
  8. Two hemostats per student if possible
  9. At least four 10 milliliter syringes per student
  10. Two pair gloves per student

      (NOTE: Gloves do not need to be sterile for class, but they can be packaged to simulate sterile gloves.)
  11. One mask per student if possible
  12. At least six packages antimicrobial ointment per student
  13. Cloth to simulate sterile drape
  14. Tape, 4-inch foam and/or 2-inch silk or paper
- B. Prepare materials to implement job sheets.
  1. Obtain a sheet of corrugated cardboard approximately 2-by-3 feet.
  2. Outline on the cardboard the head, neck, shoulders, and upper chest of a person.
  3. Insert an inside-the-needle catheter into appropriate anatomical site.

SUGGESTED ACTIVITIES

4. Cover area around insertion site and surrounding 8 to 10 inches with a layer or layers of clear plastic wrap.

   (NOTE: Prepare two or three of these and use them to demonstrate procedures in job sheets.)

C. Pretest students to assess their present knowledge of the subject.

D. Provide students with objective sheet.

E. Provide students with information, assignment, and job sheets.

F. Discuss unit and specific objectives.

G. Discuss information sheet.

H. Individualize instruction for students with special needs.

I. Discuss assignment sheet.

J. Demonstrate and discuss procedures outlined in job sheets.

K. Invite IV therapist to speak on special catheters.

L. Give test.

M. Discuss test.

N. Reteach if necessary.

II. Instructional materials

- A. Objective sheet
- B. Suggested activities
- C. Information sheet
- D. Transparency masters
  1. TM #1--INC--Inside-the-Needle Catheter (Polyethylene)
  2. TM #2--Silicone Central Venous Catheter
  3. TM #3--Placement of Needle Guard over Polyethylene Central Venous Catheter
  4. TM #4--Placement and Parts of Silicone Central Venous Catheter
  5. TM #5--Placement of Hickman Catheter

SUGGESTED ACTIVITIES

E. Assignment Sheet #1--Analyze a Complication Associated with Central Venous Catheter

F. Answers to assignment sheet

G. Job sheets

  1. Job Sheet #1--Apply Temporary Dressing over Inside-the-Needle Catheter
  2. Job Sheet #2--Assist with Insertion of Inside-the-Needle Catheter
  3. Job Sheet #3--Apply Dressing After Confirmation of Placement of Inside-the-Needle Catheter
  4. Job Sheet #4--Change Dressing and Care for Insertion Site for Inside-the-Needle Catheter--Technique #1
  5. Job Sheet #5--Change Dressing and Care for Insertion Site for Inside-the-Needle Catheter--Technique #2
  6. Job Sheet #6--Perform Daily Tubing and Filter Change on Central Venous Line
  7. Job Sheet #7--Remove Central Venous Catheter
  8. Job Sheet #8--Change Dressing for Peripheral Silicone Elastomer Central Venous Catheter
  9. Job Sheet #9--Perform Dressing Care for Hickman Catheter Insertion and Exit Sites
  10. Job Sheet #10--Draw Blood Through Hickman Catheter
  11. Job Sheet #11--Administer Medication Through Hickman Catheter

H. Test

I. Answers to test

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SUGGESTED ACTIVITIES

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SPECIAL CATHETERS
UNIT XIII

INFORMATION SHEET

I. Terms and definitions

A. Antecubital fossa--Triangular area anterior to and below the elbow

B. Aspiration--Withdrawal by suction of fluids or gases from a cavity

C. Cannula clamp--Smooth, toothless clamp

D. Catheter--Hollow tube inserted into a vein for injection of fluids

E. Distal--Farthest from point of attachment or center

F. Elastomer--Polymeric substance with elastic properties similar to rubber

G. Elicit--To bring out or draw forth

H. Embolus--Mass of undissolved matter present in blood

I. Fluoroscopy--Use of a fluoroscope (type of X ray) for diagnosis or insertion of special devices

J. Hemodynamic--Pertaining to forces involved in circulating blood through the body

K. Hypertonic--Having a higher osmotic pressure than a compared solution

L. Introducer--Device for controlling, directing, and placing a tube into a blood vessel

M. Patency--State of being freely open

N. Peripheral--Located at or pertaining to the periphery; occurring away from the center

O. Polymeric--Having the characteristics of a substance formed by a combination of two or more molecules of the same substance

P. Proximal--Nearest to point of attachment or origin

Q. Silicone--Organic compound in which carbon has been replaced by silicon

R. Stylet--Slender metal device used to stiffen a catheter

S. Thoracic duct--Main lymph duct of body

T. Viscous--Sticky, gummy, thick in consistency

INFORMATION SHEET

II. Types of inside-the-needle central venous catheters (Transparencies #1 - #4)

Catheter type	Characteristics	Insertion	Uses
Polyethylene	Stiff, nonpliable plastic Large-gauge catheter EXAMPLE: 14 to 16 gauge	Venipuncture made with large-gauge needle EXAMPLE: 12 to 14 gauge Catheter is threaded through needle into vein Needle is removed from skin but left over catheter outside skin Catheter is inserted through jugular or subclavian vein into superior vena cava or right atrium	Monitoring hemodynamic status Delivering viscous fluids EXAMPLES: Blood and blood products; solutions with high glucose content, such as 50 percent glucose Delivering hypertonic fluids EXAMPLE: Hyperalimentation solution Delivering drugs to large central veins Long-term IV therapy
Silicone elastomer, Centrasil	Soft synthetic rubber Stiffened by spring wire stylet (NOTE: This stylet facilitates insertion.)	Venipuncture made with large-gauge introducer needle EXAMPLE: 14 gauge Catheter is threaded though introducer into vein Introducer needle removed from vein but small portion left in subcutaneous tissue Catheter inserted through subclavian vein into superior vena cava or right atrium	Delivering viscous fluids EXAMPLES: Blood and blood products; solutions with high glucose content, such as 50 percent glucose Delivering hypertonic fluids EXAMPLE: Hyperalimentation solution Delivering drugs to large central veins Long-term IV therapy As a heparin lock
Silicone elastomer, Intrasil	Soft synthetic rubber Coiled on a drum device (spool) with a large-gauge slotted needle without back bevel (NOTE: This drum device serves as a mechanism for theading the catheter into the vein. The slotted needle without the back bevel eliminates the possibility of shearing off catheter.) Stiffened by spring wire stylet	Venipuncture made with large-gauge slotted needle EXAMPLE: 14 to 17 gauge Catheter is threaded though needle into vein Needle and drum device are removed completely Catheter is inserted through vein at antecubital fossa, jugular, or subclavian area into superior vena cava or right atrium Catheter hub sutured in place	Delivering viscous fluids EXAMPLES: Blood and blood products; solutions with high glucose content, such as 50 percent glucose Delivering hypertonic fluids EXAMPLE: Hyperalimentation solution Delivering drugs to large central veins Long-term IV therapy As a heparin lock

INFORMATION SHEET

III. Complications of insertion and maintenance of inside-the-needle catheters (Assignment sheet #1)

Complication	Characteristics	Cause	Sign	Symptoms	Nursing Interventions	Treatment
Pneumothorax or hemothorax	Air, blood, or IV fluid accumulates in pleural space, resulting in partial or complete collapse of lung on insertion side	Penetration of pleural space by needle and/or catheter during insersertion	Dyspnea; cyanosis; loss of breath sounds on insertion side	Chest pain	Assess breath sounds at least twice a shift for first twenty-four hours; obtain order for X-ray to confirm placement	Removal of catheter; insertion of of chest tube on insertion side,
Thoracic duct puncture	Lymph node is penetrated, resulting in a leakage of lymph fluid outside of lymph system	Puncture of lymph system in chest by needle during insertion	Leakage of clear fluid at insertion site	None	Monitor dressing for signs of leaking fluid	Removal of catheter; application of pressure over insertion site
Arterial puncture	Artery in neck or chest is penetrated; can result in formation of mediastinal hematoma	Puncture of artery by needle during insertion	Rapid return of bright red blood upon needle insertion	None	None	Immediate removal of needle; application of pressure over insertion site
Air embolus	Air enters venous system (NOTE: Research has shown that 60 milliliters or more of air entering venous system may produce signs of air embolus.)	Opening of system to air (NOTE: This opening can occur during insertion and/or any time IV system is opened.) EXAMPLES: Tubing change, accidental tubing seperation	Dyspnea; cyanosis; decreased BP; syncope; loud continuous churning sound heard over precordium	Chest pain	Secure all connections in IV system	Place patient on left side in modified Trendelenberg position (NOTE: This position causes the air to rise to the top of the right atrium where it is slowly added to the pulmonary circulation and absorbed.)

INFORMATION SHEET

Complication	Characteristics	Cause	Sign	Symptoms	Nursing Interventions	Treatment
Catheter embolus	Piece of catheter enters venous circulation	Shearing off of a piece of catheter during insertion or anytime the catheter is withdrawn back through needle	Dependent upon where piece lodges; can vary from dyspnea to syncope	None	Secure needle guard over bevel of needle and check every time dressing is changed **(CAUTION: This needle guard must be secured over the catheter and needle to prevent the possible shearing off of catheter by sharp bevel of needle.)**	Surgical removal under fluoroscopy by guide wire to thoracotomy
Catheter occulusion	Catheter clogged by blood clot	Not changing solution container promptly; inadequate flushing with heparin solution when used as heparin lock	Sluggish or non-running IV solution; inability to irrigate catheter	None	Properly maintain IV system by changing solution promptly and by adequate flushing; notify physician	Removal of catheter
Catheter contamination	Catheter contaminated by microorganisms (NOTE: The most common infecting organisms are *Candida albicans, Staphylococcus epidermis* and *aureus,* and *Klebsiella.*)	Transferring microorganisms from another source, such as the hands to the IV system	Fever; swelling and possible purulent drainage at insertion site (NOTE: This complication can result in shock and even death)	None	Maintain strict aseptic technique during insertion, dressing, and/or tubing change	Removal of catheter; culture of tip and blood with administration of appropriate antibiotics **(CAUTION: An infected catheter left in place will spread the microorganisms into the bloodstream and may lead to sepsis and septic shock.)**

INFORMATION SHEET

Complication	Characteristics	Cause	Sign	Symptoms	Nursing Interventions	Treatment
Blood loss	Loss of blood; backflow of blood through IV system	Accidental separation of IV system EXAMPLES: IV tubing from catheter, IV tubing from extention tubing, IV tubing from central venous pressure manometer	Blood on bed or floor	None	Secure all connections in the IV system; notify physician	Replace blood if deemed necessary by physician
Phlebitis	Inflammation of vein wall	Irritation of vein by catheter (NOTE: This complication occurs more frequently with peripheral insertion of the Intrasil. It will begin on the third to fifth day after insertion.)	Redness at insertion site, which can extend up length of vein; swelling; warmth at insertion site, which can extend up length of vein	Pain at insertion site, which can extend up vein	Apply warm moist pack if catheter is inserted peripherally; elevate extremity; encourage mild range of motion	Heat; elevation and mild range of motion if inserted peripherally; removal of catheter if conservative measures not adequate
Venous thrombosis	Formation of a clot in insertion vein and/or its connecting veins with accompanying sclerosis	Use of polyethylene catheter instead of silicone catheter	Edema of face or extremity on insertion side; venous disention	Pain in neck, face, or extremity of insertion side	Monitor patient for possible signs of thrombus	Removal of catheter and administration of anticoagulants (NOTE: The only way to confirm diagnosis of a thrombus is by an X ray called a *venogram*.)

INFORMATION SHEET

IV. Nursing responsibilities and interventions with regard to inside-the-needle catheters

A. Explain all procedures to patient and family

(NOTE: Always use terms the patient and family can understand; explain position in which patient will be placed and the approximate discomfort.)

B. Answer any questions and correct misconceptions

C. Elicit patient understanding

D. Obtain signed consent form

(NOTE: Most hospitals require a signed consent for the insertion of a subclavian catheter. Obtain and know your hospital's policy.)

E. Obtain necessary equipment before physician comes to perform insertion

F. Enlist the patient's cooperation, if possible, by instructing patient to

1. Keep head turned away from insertion site during insertion

2. Keep hands away from site

3. Take a deep breath and then bear down as if trying to have a bowel movement when so instructed

   (NOTE: This procedure is called *Valsalva's maneuver.*)

4. Remain very still during insertion

G. Assist with insertion (Job Sheet #1)

H. Monitor vital signs during insertion and every fifteen minutes for at least one-half hour after insertion

I. Apply temporary dressing (Job Sheet #2)

J. Order and make sure chest X ray is taken

(NOTE: A chest X ray is necessary to confirm the placement of the catheter.)

K. Apply permanent dressing (Job Sheet #3)

L. Monitor for signs and symptoms of complications; notify physician if necessary

M. Instruct patient in how to resume mobility

INFORMATION SHEET

N. Instruct patient to notify nurse if problems occur with equipment or at insertion site

EXAMPLES: Itching and/or burning at site, difficulty in breathing, bleeding

O. Instruct patient not to tamper with any part of system or dressing

P. Change dressing and care for insertion site as per hospital policy (Job Sheets #4 and #5)

(NOTE: Obtain and know your hospital's policy and procedure regarding dressing change for inside-the-needle catheter.)

Q. Use great care if giving medications through line

(NOTE: Check carefully for incompatibilities. Minute particulate matter such as crystals could coat the lumen of the catheter and reduce the flow.)

R. Avoid multiple punctures into line

(CAUTION: Leave all piggyback lines inserted, and change only when the whole system is changed.)

(NOTE: Each time the system is punctured or opened there is the possibility of introducing microorganisms into the line.)

S. Change tubing every twenty-four hours (Job Sheet #6)

T. Avoid transfusing blood through line if polyethylene catheter is in place

(CAUTION: Red blood cells tend to cling to the wall of the polyethylene catheter and reduce the inside diameter of catheter, which results in reduction of flow.)

U. Use in-line filter

V. Avoid injections under high pressure if silicone catheter is in place

W. Remove central venous catheter (Job Sheet #7)

(NOTE: Check your hospital's policy regarding removal of a central venous catheter. Some hospitals require the physician to remove these lines.)

V. Hickman catheter (Transparency #5)

A. Characteristics

1. Is large gauge

(NOTE: The inside diameter is 1.6 millimeters.)

2. Is composed of polymeric silicone rubber

INFORMATION SHEET

B. Insertion

1. Is done in surgery under fluoroscopy
2. Is through an incision over subclavian vein, isolating the cephalic vein
3. Is brought under and out of skin approximately 4 to 8 inches below insertion site (proximal tip)
4. Is inserted into right atrium (distal tip)
5. Is anchored in place in subcutaneous tissue with Dacron felt cuff that lies under skin

   (NOTE: A female Luer-Lok adapter is placed on threaded proximal tip after insertion.)

C. Uses

1. Administering fluids or drugs

   (NOTE: Because of the large gauge, this catheter is ideal for the infusion of viscous fluids.)

   EXAMPLES: Blood and blood products, hyperalimentation solution
2. As a heparin lock
3. Drawing blood
4. Monitoring hemodynamic status

   EXAMPLE: Central venous pressure

VI. Nursing responsibilities and interventions with regard to the Hickman catheter

A. Explain catheter and procedure to patient and family before insertion

B. Obtain signed consent form

C. Perform dressing care after return from surgery (Job Sheet #9)

D. Obtain and know policy and procedures for drawing blood, administering medications, and dressing and site care (Job Sheets #9-#11)

E. Obtain and make sure a cannula clamp is available and readily accessible

(CAUTION: This catheter does not need to be kept clamped when not in use, but the female adapter must be kept closed with an IV tubing or injection cap.)

INFORMATION SHEET

F. Protect with appropriate material catheter area to be clamped

(CAUTION: If the clamp is placed directly onto catheter, it could damage the catheter.)

G. Maintain adequate supply of injection caps if catheter is used as a heparin lock

(NOTE: When catheter is used as a heparin lock, it is recommended that all medications and/or injections be piggybacked through an injection cap. Obtain and know your hospital's policy and procedure.)

H. Maintain adequate supply of povidone iodine prep sponges

I. Check for and prevent drug and/or drug/solution incompatibilities

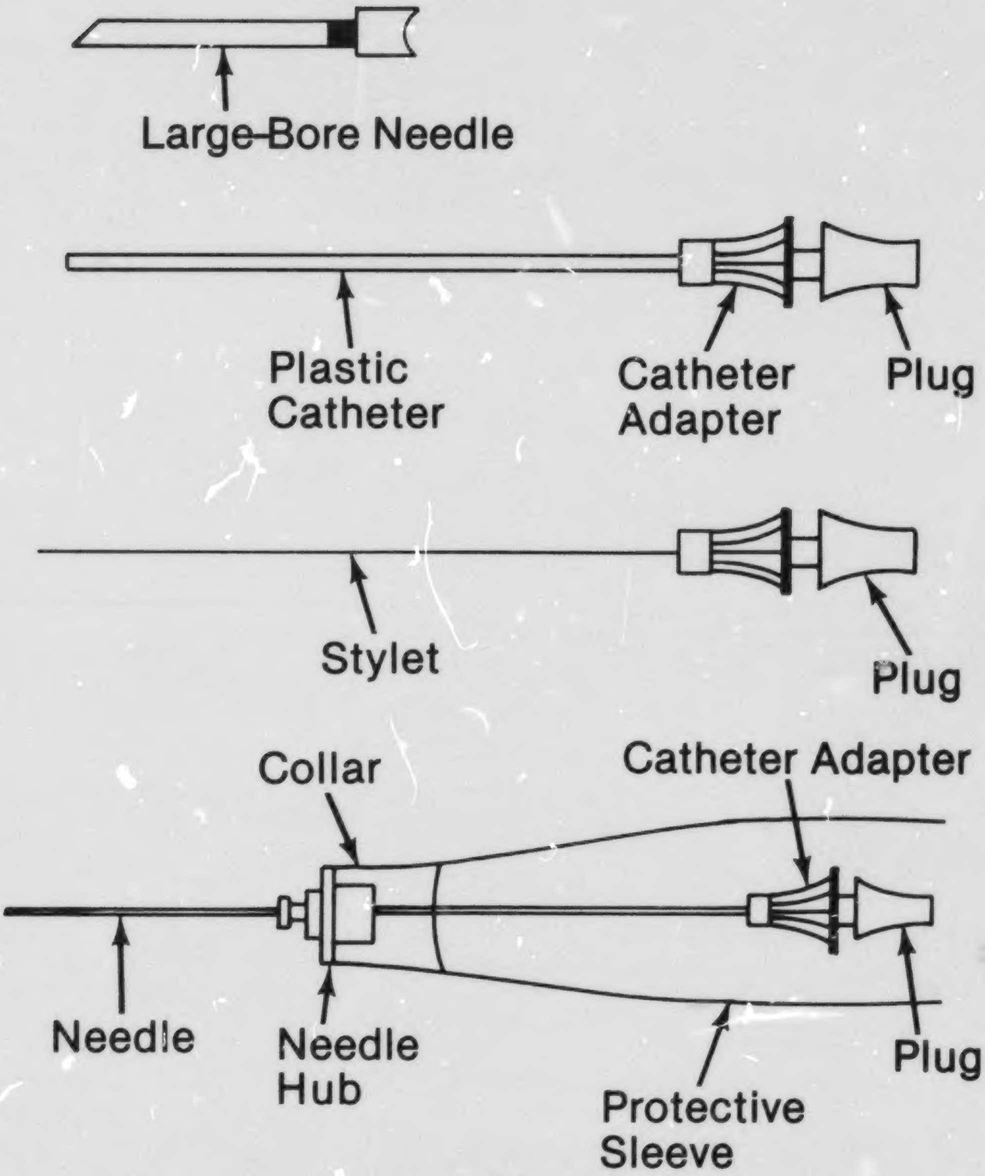
J. Cleanse injection cap thoroughly with povidone iodine sponges before insertion of needle

K. Discard old cap and apply new injection cap whenever cap is removed

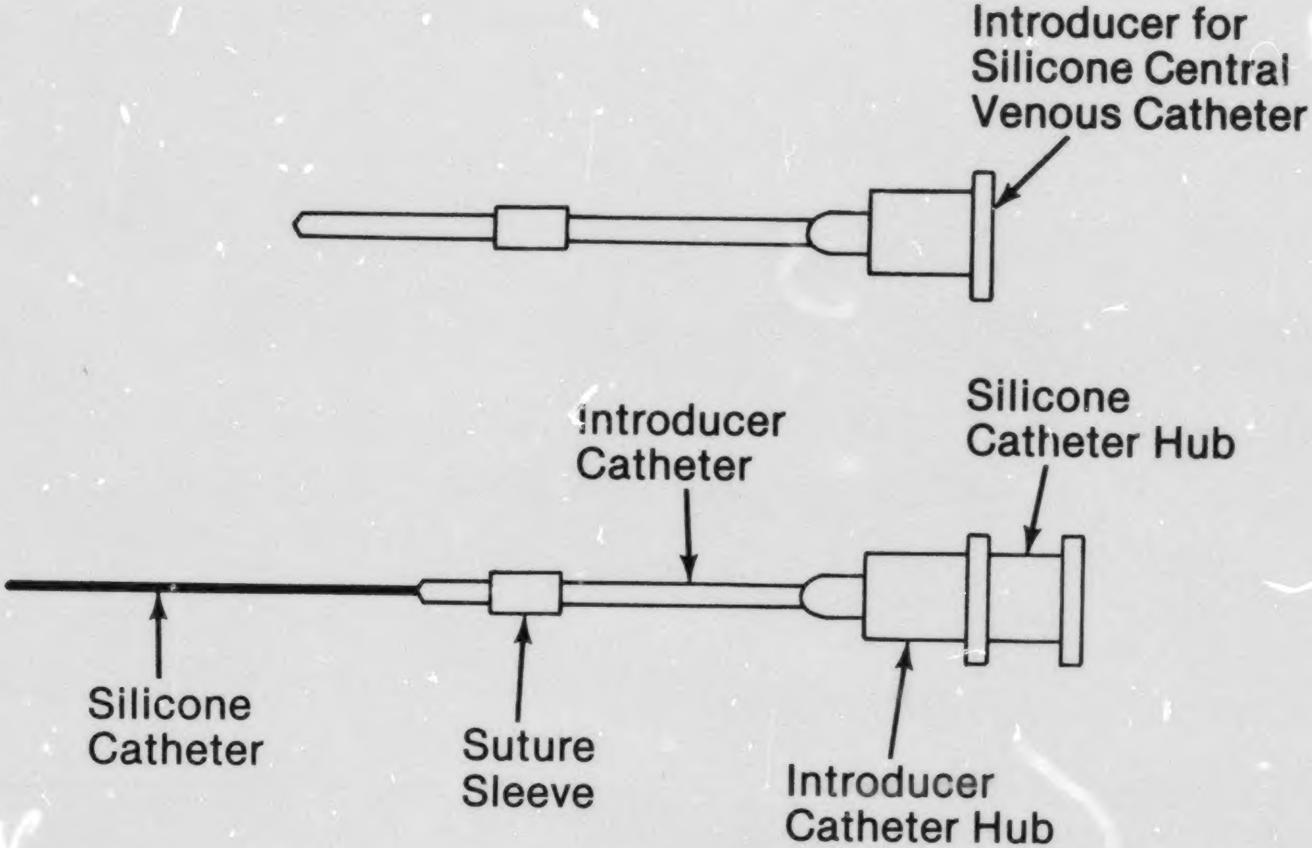
L. Use strict aseptic technique whenever using catheter

M. If catheter is being used as heparin lock, flush as per hospital policy at least twice per day with heparin solution

INC--Inside-the-Needle Catheter (Polyethylene)



Silicone Central Venous Catheter



Introducer for Silicone Central Venous Catheter

Introducer Catheter

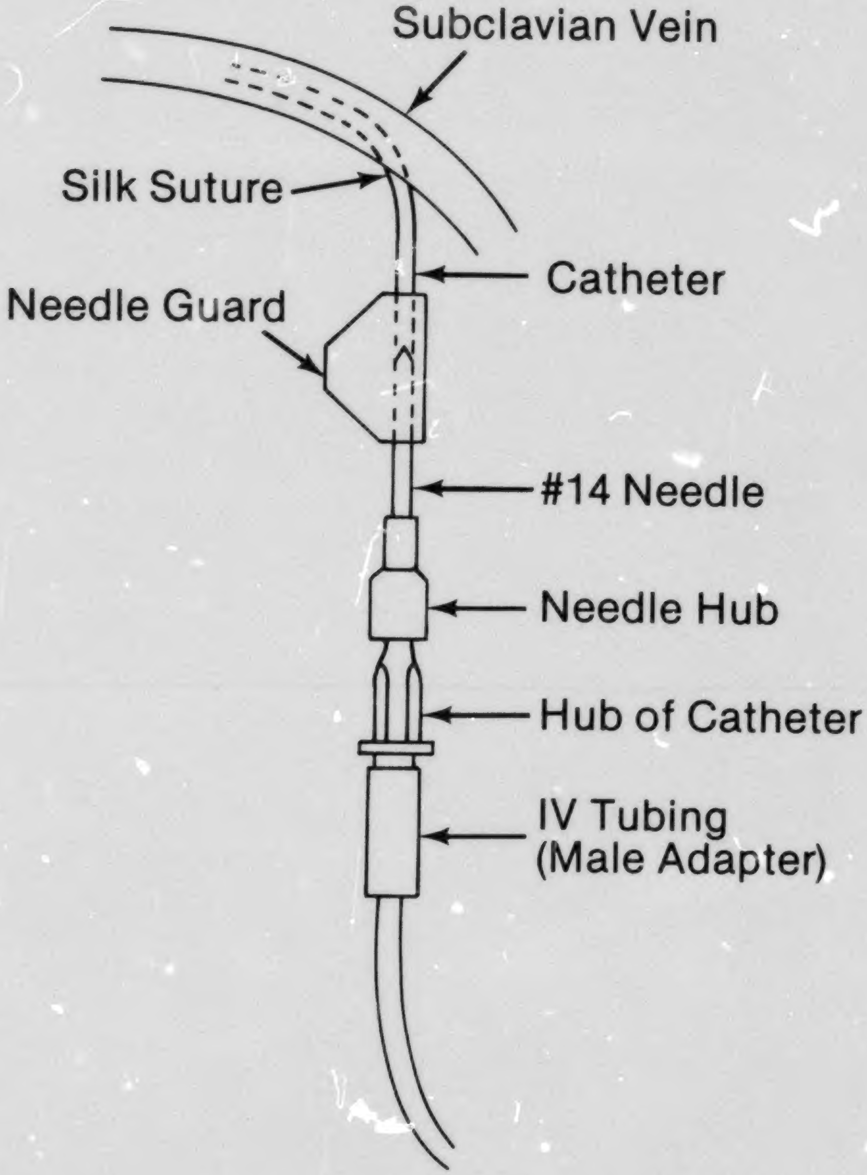
Silicone Catheter Hub

Silicone Catheter

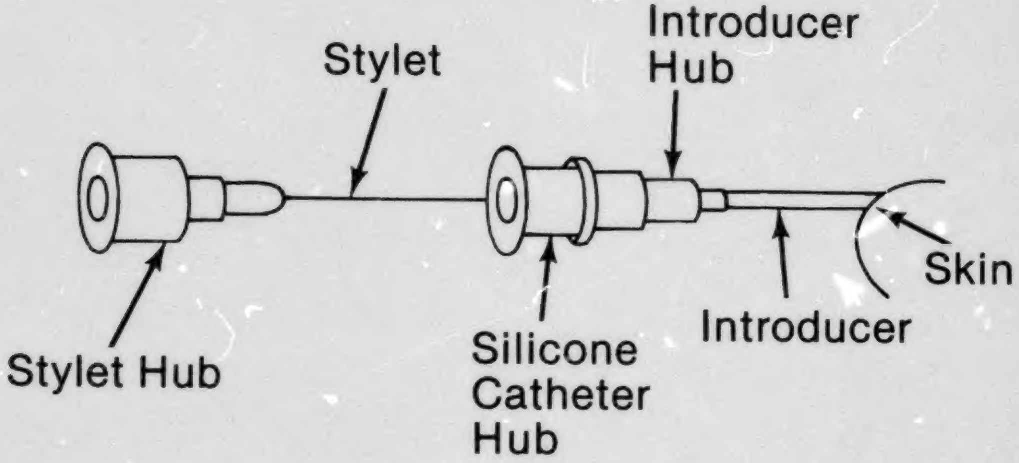
Suture Sleeve

Introducer Catheter Hub

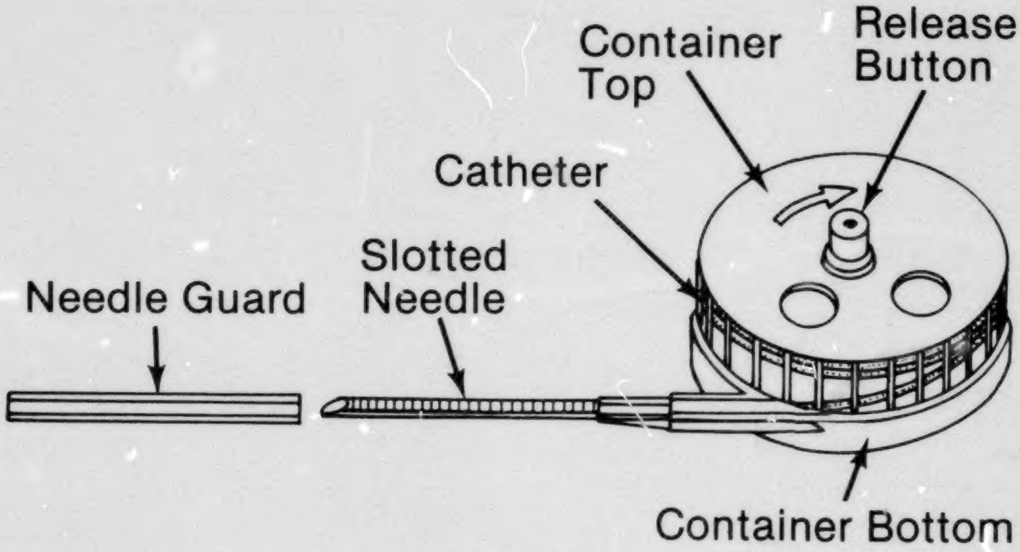
Placement of Needle Guard over Polyethylene Central Venous Catheter



Placement and Parts of Silicone Central Venous Catheter

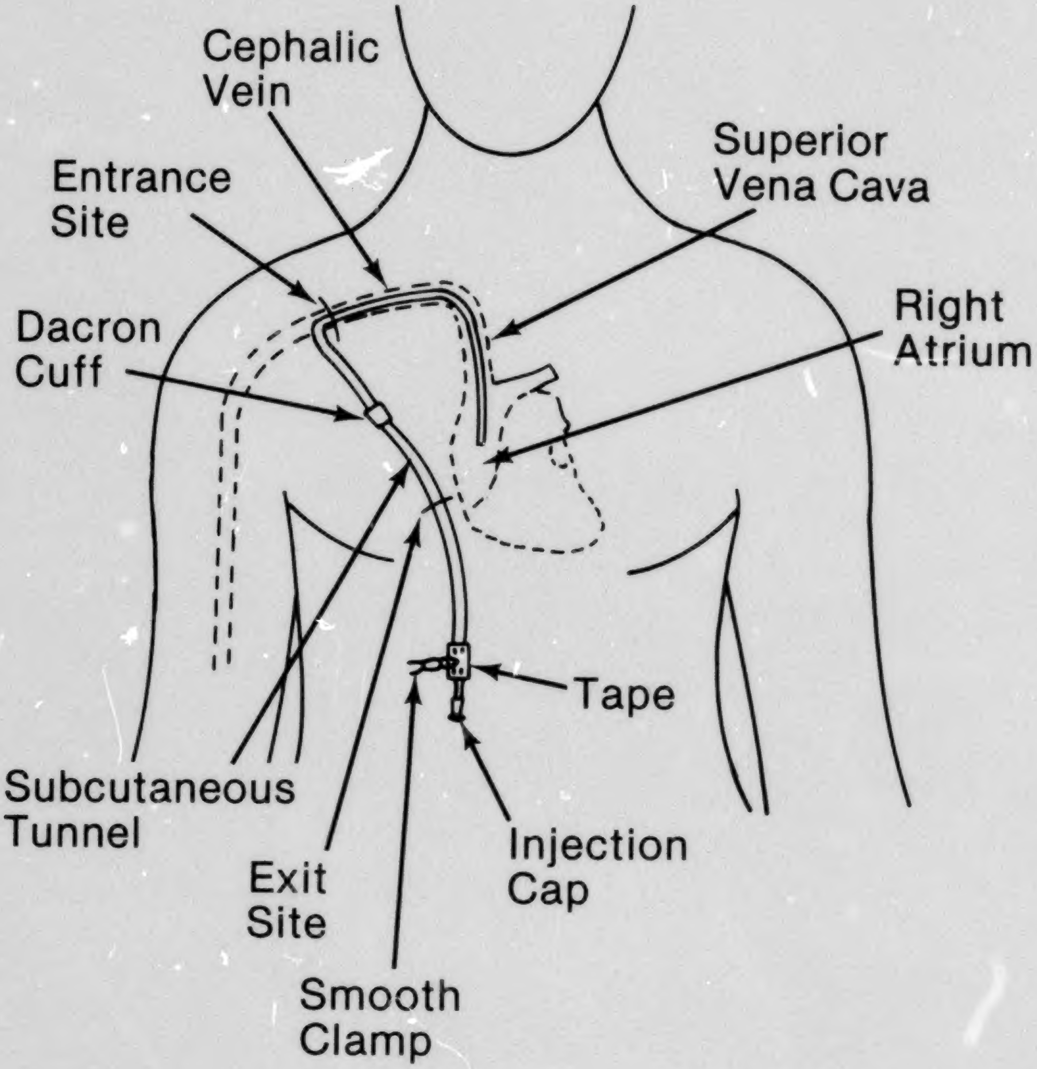


Centrasil



Intrasil

Placement of Hickman Catheter



SPECIAL CATHETERS
UNIT XIII

ASSIGNMENT SHEET #1--ANALYZE A COMPLICATION ASSOCIATED WITH CENTRAL VENOUS CATHETER

NAME ______________________________ SCORE ____________

This assignment sheet is designed to aid the nurse in recognizing the signs and symptoms of one of the complications of a central venous catheter. The prevention of such a complication is accomplished mainly by nursing interventions.

Mrs. Y. Knnott, a 32 year old female, is experiencing her tenth postoperative day, following an extensive bowel resection for ulcerative colitis. A subclavian polyvinyl chloride central venous line is in place on the right. Hyperalimentation solution is infusing. At 9 A.M. she was helped to the chair and made comfortable. As the nurse was making the bed, Mrs. Knnott complained of difficult breathing, became cyanotic, and slumped over in the chair. Upon rushing to Mrs. Knnott and checking her, the nurse discovered that the patient's gown on the right upper chest was wet.

PART I

A. What is the problem and its possible cause? ______________________________

____

____

____

____

B. What nursing interventions would you follow if you were the nurse taking care of Mrs. Knnott? Write interventions in correct order.

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____

ASSIGNMENT SHEET #1

10. ______________________________

11. ______________________________

12. ______________________________

13. ______________________________

PART II

What nursing interventions should the nurse have observed to prevent the occurrence of this complication?

A. ______________________________

____

B. ______________________________

____

C. ______________________________

____

D. ______________________________

____

E. ______________________________

____

SPECIAL CATHETERS
UNIT XIII

ANSWERS TO ASSIGNMENT SHEET

PART I

A. Respiratory distress and syncope--Possible cause: accidental separation of central venous line with a resulting air embolism

B.
1. Call for help
2. Check for source of wetness on gown with attention to subclavian catheter dressing
3. Reconnect any loose connections; change tubing as soon as patient is stable
4. Return patient to bed
5. Retape dressing; change dressing when patient is stable
6. Place on left side with head of bed in modified Trendelenberg position
7. Obtain vital signs
8. Have second nurse stay with patient and monitor vital signs
9. Notify physician
10. Be prepared to administer oxygen
11. Monitor vital signs frequently until stable
12. Reassure patient and family
13. Stay with patient until stable

PART II

A. Secure tubing and catheter connections before moving patient

B. Tape site, catheter tubing, and any connections well

C. Prevent tension on catheter or tubing

D. Avoid placing tension on IV line as patient is moved or ambulates

E. Monitor status of overall hydration

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #1--APPLY TEMPORARY DRESSING OVER INSIDE-THE-NEEDLE CATHETER

(NOTE: This is one of many methods for the application of an occlusive dressing.)

I. Equipment and materials

A. Sterile gloves in nurse's size

B. Antimicrobial ointment

C. One package cotton-tipped swab

D. One package of two gauze 2x2s

E. One package of two gauze 4x4s

F. Two-inch silk or paper tape

(NOTE: A fresh roll of tape should be obtained every time a central venous line is redressed or taped.)

II. Procedure

(NOTE: This is a practice exercise to familiarize you with the procedure before you have to perform it in the actual clinical setting.)

A. Obtain equipment and take to room

B. Identify patient, using appropriate communication tool

C. Identify yourself to patient and/or family and explain procedure

D. Wash hands

E. Open 2x2s and 4x4s

(NOTE: If overbed table field is still sterile, these may be dropped onto this field. If field is contaminated, and it frequently is by now, clear an area, carefully open sponges, and use the inside packaging as the sterile field.)

F. Open gloves and place in a readily accessible area

G. Prepare an adequate amount of tape

(NOTE: Six 6-inch pieces should be sufficient for the temporary dressing.)

H. Open antimicrobial ointment; place open end on sterile packaging of 4x4s opposite 4x4s

JOB SHEET #1

I. Open cotton-tipped swab

(CAUTION: Take care to keep cotton tip sterile.)

J. Squeeze moderate amount of antimicrobial ointment onto cotton tip of swab

(CAUTION: Carefully avoid touching cotton tip with the antimicrobial ointment packaging.)

K. Apply a thin layer of ointment around catheter where it enters skin

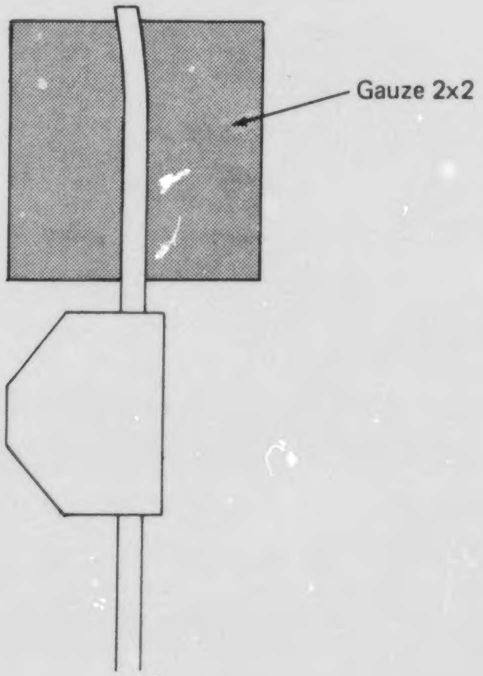
L. Discard swab

M. Put on sterile gloves

N. Check needle guard to make sure that it is securely fastened

O. Place one 2x2 under catheter (Figure 1)

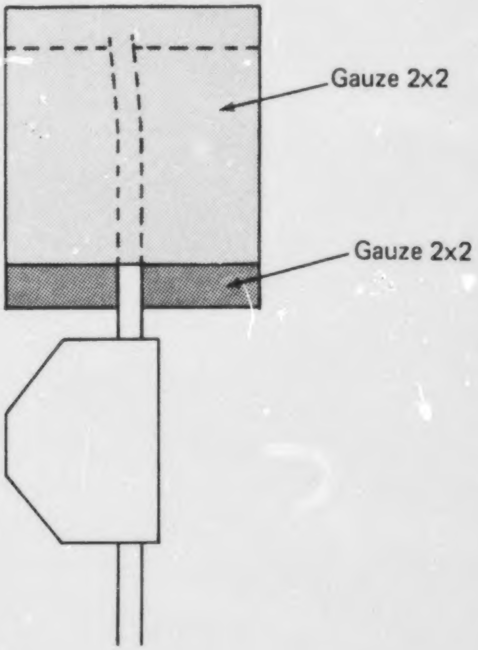
FIGURE 1



JOB SHEET #1

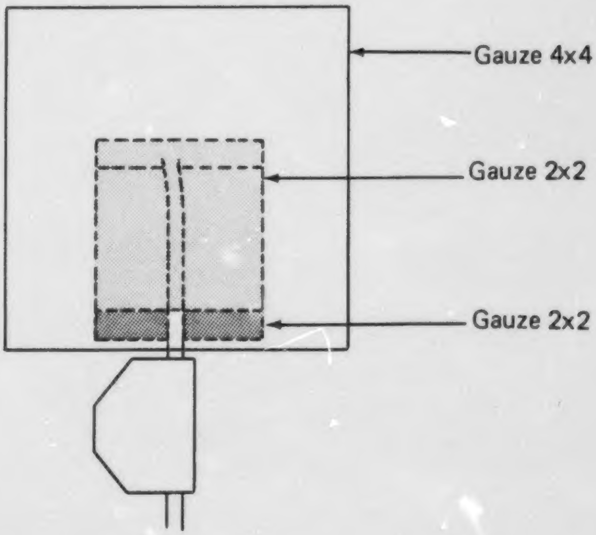
P. Place second 2x2 over insertion site, catheter, and previous 2x2 (Figure 2)

FIGURE 2



Q. Place gauze 4x4 over 2x2s (Figure 3)

FIGURE 3



JOB SHEET #1

R. Cover dressing completely with tape

(NOTE: Caution the patient that this is a temporary dressing and that movement should be kept at a minimum until a more permanent dressing is applied after a chest X ray is completed.)

S. Clean room and discard used equipment in appropriate place

T. Wash hands before leaving room

U. On the appropriate chart forms, document both your actions and the physician's before, during, and after insertion

V. On appropriate chart form, document patient's understanding and tolerance of procedure

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #2--ASSIST WITH INSERTION OF INSIDE-THE-NEEDLE CATHETER

(NOTE: The demonstration of this procedure by the instructor and return demonstration by the students will be difficult except in the actual clinical setting.)

I. Equipment and materials

A. Equipment

1. Variety of central venous catheters

   (NOTE: If possible, find out which type and size catheter the physician prefers before the physician comes to perform the insertion.)

2. Sterile, non-Luer-Lok 10 cc syringe
3. Sutures, one package each of sizes 2-0 and/or 4-0 silk, with needle
4. One pair sterile scissors
5. At least two sterile hemostats
6. One needle holder
7. Two 3-ml sterile syringes
8. Two 23- or 25-gauge needles

   (NOTE: These needles will usually be attached to the syringe.)

9. Appropriate IV tubing
10. In-line filter

    (NOTE: Filter may be built into the IV tubing. A built-in filter is preferred to minimize the number of connections in the line.)

11. Razor, if necessary
12. Bath blanket or large bath towel

B. Materials

1. Three packages of two gauze 2x2s
2. Twenty packages of two gauze 4x4s
3. 250-ml container of IV solution--usually D_5W
4. One pair physician's size sterile gloves

JOB SHEET #2

5. Two pair nurse's size sterile gloves

   (NOTE: One pair of nurse's gloves will be used to apply the temporary dressing.)

6. Sterile drapes, 12-by-12 inch to 24-by-24 inch

   (NOTE: Obtain a sufficient number [three to six, depending on size] to completely surround site and cover overbed table.)

7. Povidone iodine or merthiolate prep solution

   (NOTE: Check to see if physician has a preferred agent.)

8. Alcohol prep solution

9. Tincture of benzoin

   (NOTE: The use of this product will depend upon the type of tape used to secure the dressing.)

10. Local anesthetic of physician's choice

    EXAMPLE: 1% xylocaine without epinephrine

11. Alcohol prep sponges

12. Antimicrobial ointment

13. Cotton-tipped swabs

14. Two-inch tape

    EXAMPLES: Silk or paper tape for temporary dressing, foam tape for permanent dressing

    (NOTE: A fresh roll of tape must be obtained every time a central venous line is redressed or taped.)

15. Three masks

II. Procedure

(NOTE: Procedure will vary according to physician's preference and patient's condition.)

A. Obtain equipment and take to room

B. Identify yourself to patient and/or family and explain procedure

   (NOTE: Family members will be asked to leave the room during the procedure. Any history of allergy to a prep solution should be ascertained when explaining the procedure.)

JOB SHEET #2

C. Identify patient, using appropriate communication tool

D. Obtain signed consent form from patient or family

E. Place wastebasket close to work area

F. Wash hands

G. If patient is conscious and able to cooperate, have patient practice Valsalva's maneuver

(NOTE: If patient is unconscious or uncooperative, applying compression to the abdomen can help raise the thoracic pressure.)

H. Place rolled bath blanket or towel lengthwise down spine, between shoulders

(NOTE: Placement hyperextends the shoulders and tends to increase the distance between the subclavian vein and the lung.)

I. Place the bed in a modified Trendelenberg position

(NOTE: The Trendelenberg position tends to increase the central venous pressure and helps distend the veins in the upper body.)

(CAUTION: If the patient has any respiratory difficulty, do not place in this position.)

J. Cleanse work area (usually overbed table) thoroughly with alcohol, using one package of 4x4s; discard 4x4s after use

K. Put mask on patient and yourself

(NOTE: Obtain and know your hospital's policy regarding the use of masks for central venous catheter insertion. Some hospitals require use of sterile surgical gowns for the nurse and physician.)

L. Drape overbed table with sterile drape

M. Open packaging and drop sterile contents onto drape

(CAUTION: Great care must be taken to prevent touching the sterile overbed drape with the outside packaging.)

1. Sterile drapes
2. Suture
3. Scissors
4. Hemostats
5. Needle holder
6. Two 3-ml syringes

JOB SHEET #2

7. Sterile needles, if not on syringes
8. One dozen gauze 4x4s
9. Non-Luer-Lok 10-ml syringe
10. Appropriate central venous catheter
11. Physician's gloves

N. Prepare the site

(NOTE: Preparation of the site is done by either the physician or nurse. If possible, find out which procedure the physician prefers at the time the order is given.)

1. Shave intended site and an area at least 6 inches surrounding site
2. Open povidone iodine or merthiolate prep solution and place in a convenient place
3. Instruct patient to turn head away from site and to keep head turned

   (NOTE: If the patient is unable to cooperate, enlist the help of another nurse. Have this nurse wear a mask.)
4. Put sterile glove on dominant hand
5. Pick up two 4x4s from sterile field with gloved hand
6. Hold gloved hand and 4x4s over wastebasket and pour alcohol over 4x4s, using ungloved hand

   (CAUTION: Carefully avoid touch contamination.)

   (NOTE: When the physician does the skin prep, the nurse pours the alcohol and prep solution over 4x4s held in the physician's hand.)
7. Cleanse skin with alcohol using clean-to-dirty circular technique

   (CAUTION: Hold the 4x4s so as not to touch the skin with the sterile glove.)
8. Discard 4x4s
9. Pick up two 4x4s from sterile field with gloved hand
10. Hold gloved hand and 4x4s over wastebasket and pour povidone iodine or merthiolate prep solution over 4x4s, using ungloved hand

JOB SHEET #2

11. Cleanse skin with prep solution using clean-to-dirty circular technique

12. Discard 4x4s

13. Repeat steps 9 through 12

    (CAUTION: Hold the 4x4s so as to not touch the skin with the sterile glove.)

14. Discard glove

15. Allow prep solution to air dry

O. Cleanse rubber stopper of local anesthetic bottle with alcohol sponge

P. Invert bottle and hold to allow physician to draw up anesthetic

(NOTE: The physician will have put on sterile gloves.)

Q. Prepare and set up the D_5W and administration set; place in a convenient place

(NOTE: If this cannot be accomplished quickly while local anesthetic is taking effect, then this must be done before physician enters room.)

R. Attach administration set to catheter as soon as insertion is completed

S. Open flow rate to a rapid flow for approximately fifteen seconds

(NOTE: A brief rapid flow clears the catheter of any backflow of blood.)

T. Set flow rate slightly faster than KVO rate

EXAMPLE: 20 ml an hour

U. Apply temporary dressing as outlined in Job Sheet #1

V. Order chest X ray to confirm placement of catheter

W. Clean room and discard used equipment in appropriate place

X. Wash hands before leaving room

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #3--APPLY DRESSING AFTER CONFIRMATION OF PLACEMENT OF INSIDE-THE-NEEDLE CATHETER

(NOTE: This is one of many methods for the application of an occlusive dressing.)

I. Equipment and materials

   A. Nurse's size sterile gloves

   B. One package of two gauze 4x4s

   C. Tape

      1. 4-inch wide foam

      2. 1-inch wide silk or paper

   (NOTE: If foam tape is is unavailable, 2- to 4-inch silk or paper tape will suffice.)

   D. Tincture of benzoin

   (NOTE: Check the hospital procedure for the use of this substance.)

   (CAUTION: Tincture of benzoin must never be used if foam tape or transparent dressing is used.)

   E. Two packages cotton-tipped swabs

   F. Masks for patient and nurse

II. Procedure

   A. Obtain equipment and take to room

   (NOTE: This equipment is needed for insertion and may already be in room.)

   B. Identify yourself to patient and/or family and explain procedure

   C. Identify patient using appropriate communication tool

   D. Place wastebasket close to work area

   E. Wash hands

   F. Put masks on patient and yourself

   G. Have patient turn head away from site and keep head turned away

   (NOTE: If patient is unable to or unwilling to cooperate, enlist the help of another nurse.)

JOB SHEET #3

H. Remove tape and 4x4s; discard in wastebasket

I. Open new 4x4s, keeping inside of packaging sterile; lay open on bedside table

J. Open gloves and place on bedside table

K. Place bedside table close to head of bed

L. Open tincture of benzoin if required

M. Open cotton-tipped swabs and place tips into benzoin

(CAUTION: Tincture of benzoin should not be used if foam tape is used. It will make these dressings adhere so securely that they will be extremely difficult to remove.)

N. Prepare three 5-inch pieces of 4-inch wide foam tape; place in readily accessible area

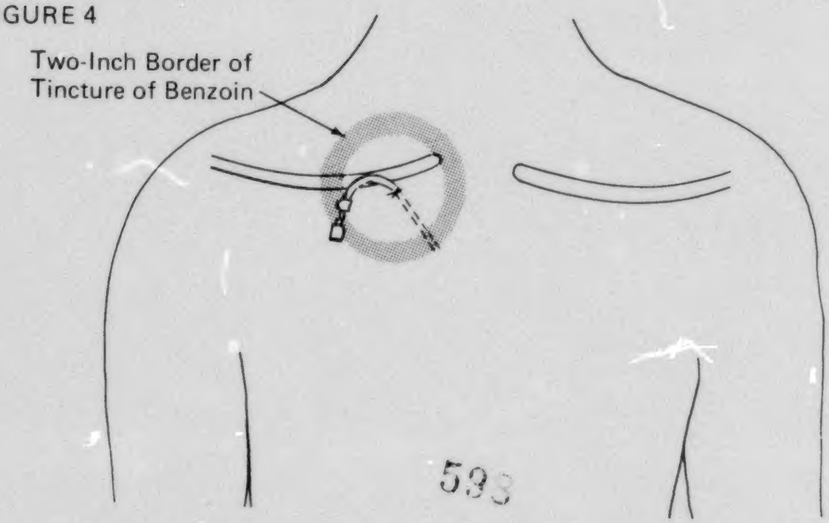
O. If foam tape is unavailable, prepare six 5-inch pieces of 2- or 4-inch wide silk or paper tape

(NOTE: Be sure to turn down a tab on the tape to facilitate easy removal.)

P. Paint 2-inch border of tincture of benzoin approximately 4 inches from insertion site; use cotton-tipped swabs if paper or silk tape is used (Figure 4)

(CAUTION: Tincture of benzoin should not be used if foam tape is used. It will make these dressings adhere so securely that they will be extremely difficult to remove.)

FIGURE 4

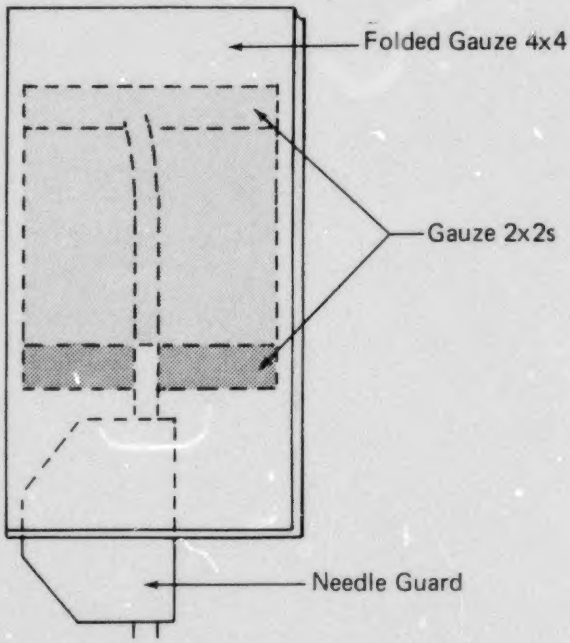


JOB SHEET #3

Q. Put on gloves

R. Fold 4x4 in half lengthwise and place over 2x2s and insertion site (Figure 5)

FIGURE 5



S. Remove glove from dominant hand; discard in wastebasket

T. Holding folded 4x4 in place with gloved, nondominant hand, place tape 1 inch above top of gauze sponges

U. Smooth tape downward over sponges

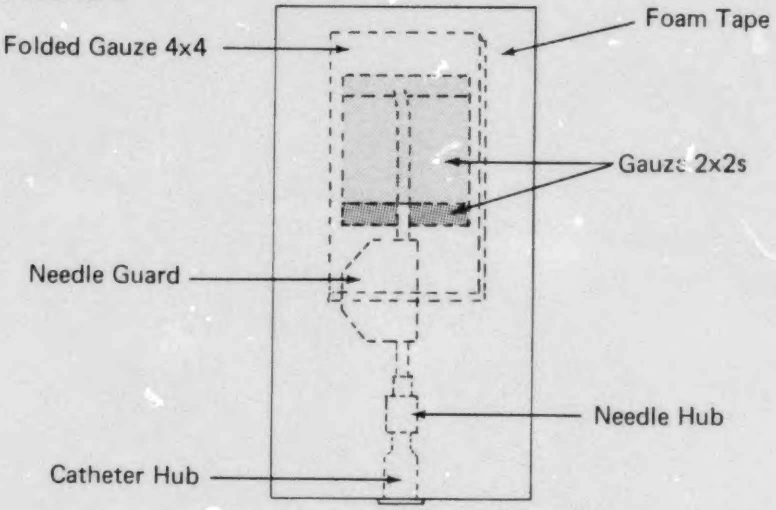
(NOTE: Tape should extend at least 1 to 2 inches beyond sides of gauze sponges.)

JOB SHEET #3

V. Extend tape down to hub of catheter (Figure 6)

(NOTE: Do not place tape over IV tubing. Use a second piece of tape to extend this far, if necessary.)

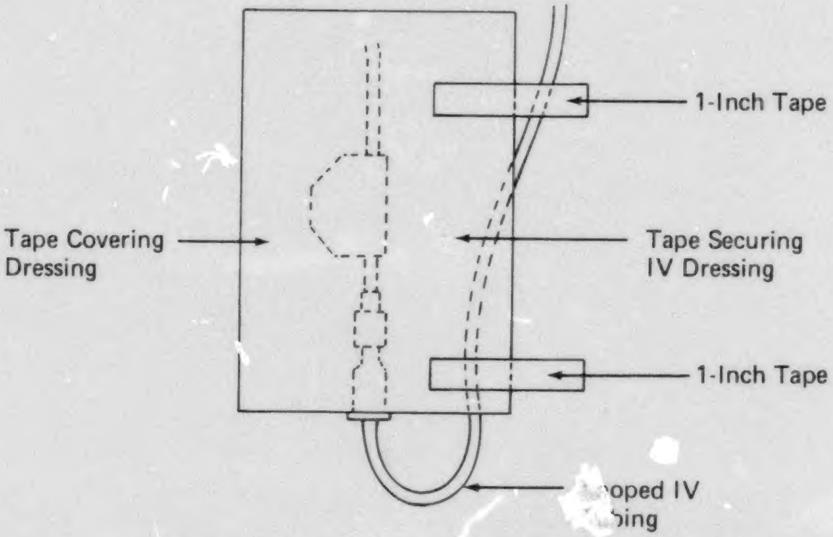
FIGURE 6



W. Loop IV tubing back up and secure with 1-inch silk or paper tape (Figure 7)

(NOTE: To secure the IV tubing into the catheter hub, silk or paper tape can be brought slightly over tape securing dressing.)

FIGURE 7



JOB SHEET #3

X. Tape all connections securely

Y. If filter is at distal portion of tubing, secure filter to chest with tape

Z. Label site and tubing

AA. Discard any used equipment in appropriate place

BB. Encourage patient to resume previous mobility

(NOTE: The use of a long tubing or an extension tubing can aid in the mobility of the patient.)

CC. Wash hands before leaving room

DD. Document your actions on the appropriate chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #4--CHANGE DRESSING AND CARE FOR INSERTION SITE FOR INSIDE-THE-NEEDLE CATHETER--TECHNIQUE #1

(NOTE: This is one of many methods for the application of an occlusive dressing.)

I. Equipment and materials

(NOTE: Manufacturer's prepared dressing change kits are available. If the manufacturer's kit is used, follow enclosed instructions.)

A. Six povidone iodine prep solution swabsticks

(NOTE: Check with the patient regarding possible allergy to iodine or Betadine. If there is an allergy, merthiolate should be used.)

B. Six alcohol prep solution swabsticks

C. Antimicrobial ointment

D. One package of two nonwoven gauze 2x2s

E. Four packages of two gauze 4x4s

F. Sterile scissors

G. Sterile drape

H. Two pair nurse's size sterile gloves

I. Masks for nurse and patient

J. Tincture of benzoin

(NOTE: Check the hospital procedure for use of this substance.)

(CAUTION: Tincture of benzoin must never be used if foam tape or transparent dressing is used.)

K. One package cotton-tipped swabs

L. Tape

1. 4-inch wide foam
2. 1-inch wide silk or paper

(NOTE: If foam tape is unavailable, 2- to-4-inch silk or paper tape will suffice. Fresh rolls of tape should be obtained each time a central venous line is redressed or taped.)

M. Two tall, clean, empty paper cups

JOB SHEET #4

II. Procedure

(NOTE: Obtain and know your hospital's procedure for central venous catheter care. Policy and procedure for each hospital varies. The policy for dressing change can vary from once every forty-eight hours to once per week.)

A. Verify requirement for dressing change by using appropriate communication tool

EXAMPLES: Kardex, IV board, IV or medication sheet

B. Check patient's chart to learn what to expect under dressing

EXAMPLES: Type of catheter, suture used, condition of site

C. Obtain equipment and take to room

D. Identify patient using appropriate communication tool

E. Identify yourself to patient and/or family and explain procedure

F. Place wastebasket close to work area

G. Wash hands

H. Cleanse work area (usually overbed table) thoroughly with alcohol, using one package of 4x4s; discard 4x4s after use

I. Put mask on patient and yourself

J. Turn patient's head away from site and instruct patient to keep head turned during rest of procedure

(NOTE: If the patient cannot or will not cooperate, enlist the help of another nurse.)

K. Place sterile drape on overbed table

(NOTE: If using manufacturer's kit, simply opening the kit onto the table provides a sterile drape.)

L. Open swabsticks; place upright in paper cups in a convenient place on bedside table, but not on sterile field

M. Open tincture of benzoin if being used

N. Open cotton-tipped swabs and drop into benzoin

O. Open 4x4s and drop onto sterile field

(CAUTION: Be very careful not to touch sterile field with outside packaging.)

JOB SHEET #4

P. Open 2x2s and drop onto sterile field

(CAUTION: Be very careful not to touch sterile field with outside packaging.)

Q. Open antimicrobial ointment and squeeze a generous amount onto corner of sterile field

R. Open sterile scissors and drop onto sterile field

S. Remove tape securing IV tubing

T. Loosen all edges of tape covering the dressing

U. Remove old dressing with extreme care; discard

(CAUTION: Carefully avoid touch contamination at or near insertion site.)

V. Open and put on gloves

W. Remove 2x2s under catheter

X. Inspect the site and surrounding area for

   1. Signs of local complications
   2. Security of suture
   3. Security of needle guard

Y. Note any signs of complication or change

(NOTE: After the procedure is finished, report any change or complication noted.)

Z. Cleanse insertion site and 4 to 6 inches of surrounding area with alcohol swab; repeat twice, using clean-to-dirty circular motion, and being careful not to manipulate catheter

AA. Cleanse insertion site and 4 to 6 inches of surrounding area with povidone iodine swabs; repeat five times

BB. Blot prep agent dry, or lightly cleanse excess agent off skin, using alcohol swabs

(NOTE: The prep agent can cause skin irritation if left under dressing in excessive amounts.)

CC. Allow area to air dry

DD. Change gloves

JOB SHEET #4

EE. Apply antimicrobial ointment lightly around insertion site

FF. Place gauze 2x2 under catheter

GG. Place gauze 2x2 over catheter

HH. Place folded gauze 4x4 lengthwise over 2x2s and site

II. Paint 2-inch border of tincture of benzoin approximately 4 inches from insertion site; use cotton-tipped swabs if paper or silk tape is used

(CAUTION: Tincture of benzoin should not be used if foam tape or transparent dressing is used. It will make these dressings adhere so securely that they will be extremely difficult to remove.)

JJ. Cut two 6- to 7-inch pieces of 4-inch wide foam tape; place in readily accessible area

(NOTE: If foam tape is not available cut six 6- to 7-inch pieces of 2- or 4-inch wide silk or paper tape. Be sure to turn down a tab on tape to facilitate easy removal.)

KK. Remove gloves

LL. Apply tape, beginning 1 inch above top of gauze sponges; smooth tape downward over sponges

(NOTE: Tape should extend at least 1 to 2 inches beyond sides of gauze sponges.)

MM. Extend tape down to hub of catheter

(NOTE: Do not place tape over IV tubing. Use a second piece of tape to extend this far, if necessary.)

NN. Loop IV tubing back up and secure with 1 inch silk or paper tape

(NOTE: To secure the IV tubing into the catheter hub, silk or paper tape can be brought slightly lower over the tape securing the dressing.)

OO. If filter is at distal portion of tubing, secure filter to chest with tape

PP. Label site and tubing

QQ. Discard used equipment in the appropriate place

RR. Wash hands before leaving room

SS. Document your observations and actions on the appropriate chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #5--CHANGE DRESSING AND CARE FOR INSERTION SITE FOR INSIDE-THE-NEEDLE CATHETER–TECHNIQUE #2

(NOTE: This is one of many methods for the application of an occlusive dressing.)

I. Equipment and materials

  A. Povidone iodine prep solution

  (NOTE: Check with the patient regarding possible allergy to iodine or povidone iodine. If there is an allergy, merthiolate should be used.)

  B. Alcohol prep solution

  C. Antimicrobial ointment

  D. One package of two gauze 2x2s

  E. Six packages of two gauze 4x4s

  F. Two sterile hemostats

  G. Sterile scissors

  H. Sterile drape, 24-by-24-inch

  I. Two sterile 3- to 4-ounce cups

  J. Two pair nurse's size sterile gloves

  K. Two masks

  L. Tincture of benzoin

  (NOTE: Check the hospital procedure for use of this substance.)

  (CAUTION: Tincture of benzoin must never be used if foam tape or transparent dressing is used.)

  M. One package cotton-tipped swabs

  N. Tape

    1. 4-inch foam

    2. 1-inch silk or paper

    (NOTE: If foam tape is unavailable, 2- to 4-inch silk or paper tape will suffice. Fresh rolls of tape should be obtained whenever a central venous line is redressed or taped.)

JOB SHEET #5

II. Procedure

(NOTE: Obtain and know your hospital's procedure for central venous catheter care. Policy and procedure for each hospital varies. The policy for dressing change can vary from once every forty-eight hours to once a week.)

A. Verify requirement for dressing change by using appropriate communication tool

EXAMPLES: Kardex, IV board, IV or medication sheet

B. Check patient's chart to learn what to expect under dressing

EXAMPLES: Type of catheter, suture used, condition of site

C. Obtain equipment and take to room

D. Identify patient using appropriate communication tool

E. Identify yourself to patient and/or family and explain procedure

F. Place wastebasket close to work area

G. Wash hands

H. Cleanse work area (usually overbed table) thoroughly with alcohol, using one package of 4x4s; discard 4x4s after use

I. Put mask on patient and yourself

J. Turn patient's head away from site and instruct patient to keep head turned during rest of procedure

(NOTE: If the patient cannot or will not cooperate, enlist the help of another nurse.)

K. Place sterile drape on overbed table

L. Open sterile cups and place on sterile field

(NOTE: This can be done by folding sterile covering back over your hand and grasping cup with thumb and first finger over lip of cup, keeping sterile covering between cup and fingers.)

M. Open sterile hemostats and drop onto sterile field

N. Open sterile scissors and drop onto sterile field

O. Open sterile 2x2s and 4x4s and drop onto sterile field

(CAUTION: Be very careful not to touch sterile field with outside packaging.)

JOB SHEET #5

P. Open antimicrobial ointment and squeeze a generous amount onto corner of sterile field

Q. Open povidone iodine prep solution; pour small amount prep solution into wastebasket

(NOTE: This step is not necessary if using individual packages of prep solution.)

R. Fill one cup with povidone iodine prep solution

S. Open alcohol prep solution; pour small amount into wastebasket

(NOTE: This step is not necessary if using individual packages of prep solution.)

T. Fill second cup with alcohol prep solution

U. Open tincture of benzoin

V. Open cotton-tipped swabs and drop into benzoin

W. Remove tape securing the IV tubing

X. Loosen all edges of tape covering the dressing

Y. Remove old dressing with extreme care; discard

(CAUTION: Carefully avoid touch contamination at or near insertion site.)

Z. Open and put on sterile gloves

AA. Remove 2x2s under catheter; discard

BB. Inspect the site and surrounding area for

1. Signs of local complications
2. Security of suture
3. Security of needle guard

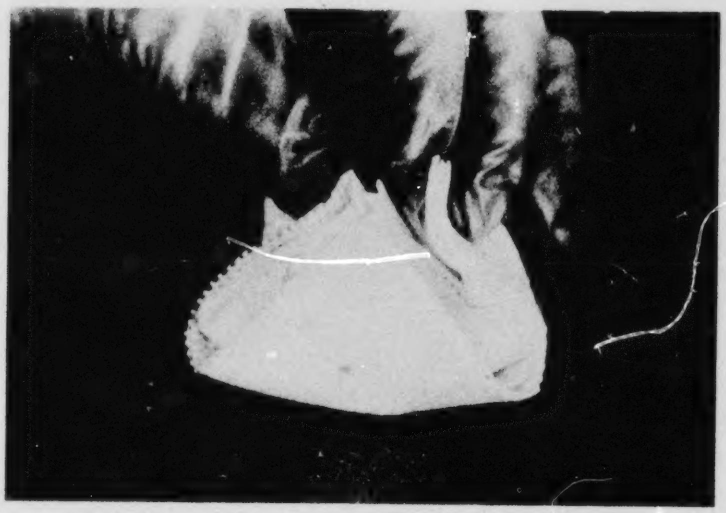
CC. Note any signs of complication or change

(NOTE: After the procedure is finished, report any change or complication noted.)

JOB SHEET #5

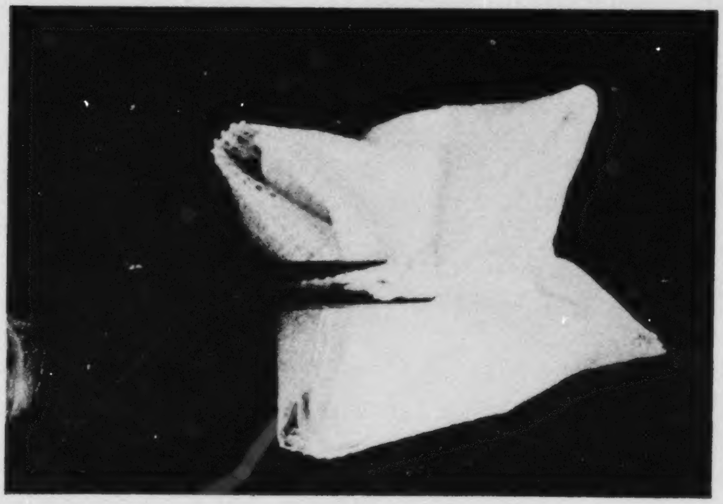
DD. Using nondominant hand, fold 4x4 with edges together into center (Figure 8)

FIGURE 8



EE. Grasp edges of 4x4 with a hemostat using dominant hand (Figure 9)

FIGURE 9



JOB SHEET #5

FF. Dip 4x4 into cup containing alcohol solution

GG. Cleanse insertion site and 4 to 6 inches of surrounding area with alcohol solution; use clean-to-dirty circular motion and be careful not to manipulate catheter; discard 4x4

HH. Repeat alcohol cleansing steps two more times, using a new 4x4 each time

II. Use nondominant hand to fold 4x4 so that edges meet at center

JJ. Grasp edges of 4x4 with fresh hemostat held in dominant hand

KK. Dip sponge into cup containing povidone iodine solution

LL. Cleanse insertion site and 4 to 6 inches of surrounding area with solution, using clean-to-dirty circular motion

MM. Repeat povidone iodine cleansing steps five more times, using a new 4x4 each time

NN. Blot skin dry, or lightly cleanse excess agent off skin using alcohol, 4x4, and hemostat

(NOTE: The prep agent can cause skin irritation if left under dressing in excessive amounts.)

OO. Allow area to air dry

PP. Change gloves

QQ. Apply antimicrobial ointment lightly around insertion site

RR. Place gauze 2x2 under catheter

SS. Place second gauze 2x2 over insertion site, catheter, and previous 2x2

TT. Fold 4x4 in half lengthwise and place over 2x2s and insertion site

UU. Paint a 2-inch border of tincture of benzoin approximately 4 inches from insertion site; use cotton-tipped swabs if paper or silk tape is used

(CAUTION: Tincture of benzoin should not be used if foam tape or transparent dressing is used. It will make these dressings adhere so securely that they will be extremely difficult to remove.)

VV. Cut two 6- to 7-inch pieces of 4-inch wide foam tape; place in readily accessible area

(NOTE: If foam tape is not available, cut six 6- to 7-inch pieces of 2-inch wide silk or paper tape. Be sure to turn down a tab on the tape to facilitate easy removal.)

JOB SHEET #5

WW. Remove gloves

XX. Apply tape, starting 1 inch above top of gauze sponges

YY. Smooth tape downward over sponges

(NOTE: Tape should extend at least 1 to 2 inches beyond sides of gauze sponges.)

ZZ. Extend tape down over hub of catheter

(NOTE: Do not place tape over IV tubing. Use a second piece of tape to extend this far if necessary.)

AAA. Loop IV tubing back up and secure with 1-inch silk or paper tape

(NOTE: To secure the IV tubing into the catheter hub, silk or paper tape can be brought slightly lower over tape securing dressing.)

BBB. If filter is at distal portion of tubing, secure filter to chest

CCC. Label site and tubing

DDD. Discard used equipment in appropriate place

EEE. Wash hands before leaving room

FFF. Document your observations and actions on the appropriate chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #6--PERFORM DAILY TUBING AND FILTER CHANGE ON CENTRAL VENOUS LINE

I. Equipment and materials

A. Prescribed IV solution

B. Appropriate IV tubing

C. In-line filter

(NOTE: The preferred tubing is one that has a filter as a permanent part of the tubing.)

D. One package of two gauze 4x4s

E. Alcohol prep sponge

F. Labels for bottle and tubing

G. Tape--1-inch silk or paper

(NOTE: If foam tape is unavailable, silk or paper tape will suffice. A fresh roll of tape should be obtained each time a central venous line is redressed or taped.)

II. Preparation

(NOTE: The tubing and filter on central venous IVs must be changed every twenty-four hours to assure asepsis of the line and to prevent clogging of the filter. Coordinate tubing change with change of solution container.)

A. Verify patient's need for solution by using appropriate communication tool

EXAMPLE: Kardex, IV board, medication card

B. Obtain prescribed solution and inspect carefully

(NOTE: These solutions are prepared and labeled by the pharmacy and are kept under refrigeration.)

C. Compare additives, if hyperalimentation solution, with doctor's order and communication tool

D. Place timing strip on bottle

JOB SHEET #6

E. Obtain equipment and take to room, along with IV solution

F. Identify patient, using appropriate communication tool

G. Identify yourself to patient and/or family and explain procedure

H. Wash hands

III. Preparing solution and tubing

A. Procedure for glass bottle

1. Place bottle on a firm surface

2. Remove IV tubing from packaging; move flow-control clamp to under drip chamber and close clamp

3. Remove filter from packaging (if using filter that is not part of tubing) and place in a readily accessible place

4. Remove protective covering from spike port of bottle

(NOTE: If hyperalimenation solution is being infused, the pharmacy will have removed the metal protective cap to add the additives and will have replaced the cap with a new sterile seal.)

5. Use alcohol sponge to cleanse spike port of bottle

6. Remove protective cap from spike of IV tubing

(CAUTION: Carefully avoid touch contamination.)

7. Pierce spike port of bottle using a straight thrusting motion

(CAUTION: The use of a twisting motion might enlarge the spike port of the container and allow the introduction of microorganisms.)

8. Suspend bottle from IV pole

B. Procedure for plastic bag

1. Suspend bag from IV pole

2. Remove IV tubing from packaging; move flow control clamp to under drip chamber and close clamp

3. Remove filter from packaging (if using filter that is not part of tubing) and place in a readily accessible place

4. Remove protective covering from spike port of bag

5. Remove protective cap from spike of IV tubing

(CAUTION: Carefully avoid touch contamination.)

JOB SHEET #6

6. Pierce spike port of bag using a straight thrusting motion

   (CAUTION: The use of a twisting motion might enlarge the spike port of the container and allow the introduction of microorganisms.)

IV. Changing tubing and filter

A. Place head of bed flat

   (CAUTION: Do not lower head of bed if the patient has respiratory difficulty.)

B. Connect filter to IV tubing if it is not a permanent part of the tubing

   (CAUTION: Carefully avoid touch contamination.)

C. Open flow-control clamp, fill tubing and filter, and close clamp

   (NOTE: Some tubings will require the removal of the distal protective cap to allow filling of the tubing. This cap must be kept sterile and replaced after the tubing is filled.)

D. Turn flow-control clamp on tubing to be replaced to KVO rate

E. Remove from infusion pump tubing to be replaced if infusion pump is in use

F. Remove tape securing IV tubing

G. Have patient turn head away from site and keep head turned during rest of procedure

   (NOTE: If patient cannot or will not cooperate, enlist the aid of another nurse.)

H. Open gauze 4x4

I. Place new tubing into infusion pump if pump is being used

J. Place distal tip of new tubing in a readily accessible place

K. Slip gauze 4x4 under hub of catheter and distal tip of tubing to be replaced

   (NOTE: This makes a sterile field for tubing replacement.)

L. Remove protective cap from distal tip of new tubing and place tip between first and second finger of dominant hand

M. Have patient perform Valsalva's maneuver

   (NOTE: If patient cannot or will not cooperate, enlist the aid of another nurse to apply pressure to the abdomen.)

JOB SHEET #6

N. Quickly remove from catheter hub tubing to be changed, and connect new tubing

O. Open flow-control clamp and turn on infusion pump if pump is being used, or set flow rate to slightly more than KVO rate if using gravity flow

P. Loop IV tubing at dressing site and secure with 1-inch silk or paper tape

Q. Secure all connections with tape

(NOTE: Be sure to turn a tab down on tape to facilitate easy removal.)

R. Set flow-control clamp to prescribed rate if not using infusion pump

S. Relabel tubing

T. Discard used equipment in appropriate place

U. Wash hands before leaving room

V. Document all of your actions on the appropriate chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #7--REMOVE CENTRAL VENOUS CATHETER

I. Equipment and materials

(NOTE: Check to see if your hospital has a policy and procedure for removal of central venous lines. If so, obtain and know this procedure. Some hospitals require a physician to remove these lines.)

A. Sterile suture set

B. Sterile gloves

C. Three masks

D. Two packages alcohol prep swabsticks

E. Antimicrobial ointment

F. Two packages of two gauze 2x2s

G. One package of two gauze 4x4s

H. Alcohol prep solution

I. Foam tape, 4 inches wide

(NOTE: If foam tape in unavailable, 2- to 4-inch silk or paper tape will suffice.)

J. Equipment for culture of catheter tip, if ordered

1. Sterile suture set

2. Two pairs sterile gloves

3. Culture tube

(NOTE: It will require the help of another nurse to correctly perform the procedure for culturing the catheter tip.)

4. Sterile drape, approximately 8-by-10 inches

II. General procedure

A. Verify order for catheter removal by checking physician's order

B. Obtain equipment and take to room

C. Identify patient, using appropriate communication tool

D. Identify yourself to patient and/or family and explain procedure

(NOTE: It is probably best to ask the family to leave the room during this procedure.)

E. Place wastebasket close to work area

F. Wash hands

G. Put mask on patient and yourself

H. Cleanse work area (usually overbed table) thoroughly with alcohol, using one package of 4x4s; discard after use

I. Open sterile suture set and place on overbed table, keeping inside of packaging sterile

(NOTE: Inside of packaging will form the sterile field.)

J. Open gauze sponges and drop onto sterile field

K. Open antimicrobial ointment and squeeze a generous amount onto a corner of the sterile field

L. Turn off flow-control clamp or infusion pump

M. Remove tape and dressing; discard

N. Open alcohol swabsticks; place at edge of sterile field

O. Open and put on gloves

P. Cleanse insertion site and surrounding area with alcohol swabsticks, use all sticks and discard each after use

Q. Clip suture

(CAUTION: Be extremely careful not to clip the catheter.)

(NOTE: If a culture of the catheter tip is required, follow Procedure III of this job sheet now.)

R. Apply antimicrobial ointment to one of the 2x2s

S. Grasp catheter, holding both catheter and needle hub

T. Apply 2x2 with antimicrobial ointment and another 2x2 lightly over insertion site

JOB SHEET #7

U. Slowly and steadily withdraw catheter

(NOTE: The needle and catheter must be withdrawn together.)

(CAUTION: The catheter must never be withdrawn through the needle. Never use force to withdraw; resistance may mean vessel spasm. Let the patient relax and try again. If resistance is encountered after the patient is relaxed, tape the catheter in place and notify the physician.)

V. Make sure all of the catheter is removed

(CAUTION: If any portion is missing, notify the physician immediately.)

W. Apply pressure over site with 2x2s until any bleeding stops

X. Observe patient for

1. Respiratory changes
2. Mental changes
3. Irregular pulse

Y. Cut 4-inch piece of 4-inch wide foam tape

(NOTE: If foam tape is unavailable, cut four 4-inch pieces of 2-inch silk or paper tape.)

Z. Apply tape securely over gauze 2x2s to form an air occlusive dressing

AA. Inspect catheter after removal for

1. Rough edges
2. Length

BB. Discard used equipment in appropriate place

CC. Document all of your observations and actions on the appropriate chart forms

III. Procedure for obtaining culture of catheter tip

A. Have second nurse apply mask and open and apply glove to his or her non-dominant hand; discard extra glove

B. Open culture tube and hand to other nurse to hold in dominant hand

(CAUTION: Be sure to keep culture tube cap sterile.)

JOB SHEET #7

C. Remove and discard glove

D. Open and put on fresh sterile gloves

E. Cleanse insertion site and surrounding area with alcohol swabsticks

F. Drape area below insertion site with sterile drape

(NOTE: Drape prevents the catheter from becoming contaminated by touching the skin after removal.)

G. Clip suture

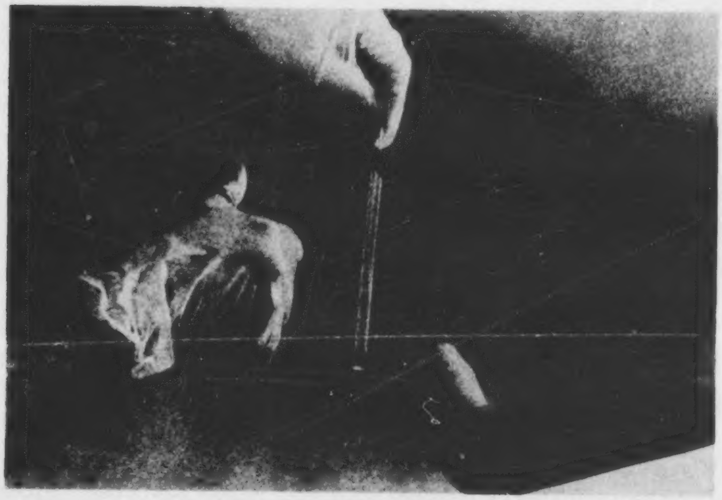
H. Apply 2x2s over insertion site; have other nurse hold them lightly in place with gloved hand

I. Slowly and steadily withdraw catheter

J. Have other nurse apply pressure over site with 2x2s

K. Place tip of catheter into culture tube and clip off with sterile scissors (Figure 10)

FIGURE 10



L. Place sterile cap on culture tube and place in a safe place

(NOTE: This culture tube should be taken to the laboratory with a requisition as soon as possible.)

M. Discard used equipment in appropriate place

N. Document all of your observations and actions on the appropriate chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #8--CHANGE DRESSING FOR PERIPHERAL SILICONE ELASTOMER CENTRAL VENOUS CATHETER

(NOTE: This is one of many methods for this procedure.)

I. Equipment and materials

   A. At least three alcohol swabsticks

   B. At least three povidone iodine swabsticks

   C. Antimicrobial ointment

   D. Two pair sterile gloves

   E. Mask for nurse and patient

   F. One package of two gauze 2x2s

   G. One roll stretch gauze

      EXAMPLES: Kerlix, Kling

   H. Alcohol prep solution

   I. One package of two gauze 4x4s

   J. Silk or paper tape, 1-inch wide

   K. Two tall, clean, empty paper cups

II. Procedure

   A. Verify patient's need for dressing change by using appropriate communication tool

      EXAMPLES: Kardex, IV board, medication or IV sheet

   B. Obtain equipment and take to room

   C. Identify patient, using appropriate communication tool

   D. Identify yourself to patient and/or family and explain procedure

   E. Wash hands

   F. Cleanse work area (usually overbed table) thoroughly with alcohol, using one package of 4x4s; discard 4x4s after use

   G. Place wastebasket close to work area

   H. Wash hands

   I. Open alcohol and povidone iodine swabsticks and place in paper cups

JOB SHEET #8

J. Open gauze 2x2s, maintaining sterility of inside packaging; place on work area

K. Open antimicrobial ointment and squeeze moderate amount onto 2x2

(CAUTION: Be very careful to avoid touching 2x2 with ointment package.)

L. Remove dressing with extreme care; discard

M. Inspect insertion site and surrounding area for

  1. Skin breakdown
  2. Redness
  3. Swelling
  4. Drainage or discharge

N. Open and put on sterile gloves

O. Cleanse skin at and 4 inches around insertion site with alcohol swabstick; use clean-to-dirty technique and discard swabstick after use; repeat

P. Cleanse skin at and 4 inches around insertion site with povidone iodine swabsticks; use clean-to-dirty technique and discard swabsticks after each use; repeat twice

Q. Allow prep agent to air dry

R. Remove excess povidone iodine prep agent with last alcohol swabstick

S. Allow alcohol to air dry

T. Open stretch gauze, maintaining sterility of inside packaging; place on work area

U. Remove gloves and discard

V. Open and put on second pair of gloves

W. Palpate site and surrounding area for

  1. Warmth
  2. Hardness of venous tract
  3. Tenderness

JOB SHEET #8

X. Place gauze 2x2 with antimicrobial ointment over insertion site

Y. Lightly wrap area with stretch gauze

Z. Apply adequate tape to secure ends of gauze

AA. Clean work area

BB. Wash hands before leaving room

CC. Document all of your observations and actions on the proper chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #9--PERFORM DRESSING CARE FOR HICKMAN CATHETER INSERTION AND EXIT SITES

(NOTE: This is one of many methods for performing dressing care for a Hickman catheter.)

I. Equipment and materials

- A. Hydrogen peroxide
- B. Six to eight cotton-tipped swabs
- C. Antimicrobial ointment
- D. Two packages of two gauze 2x2s
- E. Sterile gloves
- F. Two packages of two gauze 4x4s
- G. Tape, 1-inch wide silk or paper
- H. Tall, clean, empty paper cup

II. Procedure

- A. Obtain equipment and take to room
- B. Identify patient using appropriate communication tool
- C. Identify yourself to patient and/or family and explain procedure
- D. Place wastebasket close to work area
- E. Wash hands
- F. Open peroxide
- G. Open 2x2s and 4x4s, maintaining sterility of inside packaging; place on work area
- H. Open antimicrobial ointment and squeeze a moderate amount onto each 2x2

  (CAUTION: Be very careful to avoid touching the 2x2 with the ointment packaging.)
- I. Remove dressing with extreme care; discard
- J. Open cotton-tipped swabs; place upright in paper cup in a convenient place on work area

JOB SHEET #9

K. Open and put on gloves

L. Cleanse approximately 1 inch around entrance site with swab dipped into peroxide; use clean-to-dirty technique and discard swab after use; repeat two times

M. Cleanse approximately 1 inch around exit site with swab dipped into peroxide; use clean-to-dirty technique and discard swab after use; repeat two times

N. Use 4x4s to pat sites dry

O. Place 2x2s with antimicrobial ointment over entrance and exit sites

P. Tape 2x2s in place

Q. Discard used equipment in appropriate place

R. Wash hands before leaving room

S. Document all of your observations and actions on the proper chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #10--DRAW BLOOD THROUGH HICKMAN CATHETER

(NOTE: This is one of many methods that can be used to draw blood through a Hickman catheter.)

I. Equipment and materials

A. Syringe, 10 ml size

B. Syringe, 10 ml size containing 6 ml normal saline

C. Syringe, 10 ml size containing 6 ml heparin flush solution

(NOTE: This solution can be prepared by adding 300 units of aqueous heparin to 30 ml normal saline. This gives a dilution of 10 units per ml.)

D. Syringe, appropriate size to draw blood for all lab work

E. Sterile injection cap

F. At least four povidone iodine prep sponges

II. Procedure

(NOTE: Have one student play the role of laboratory technician.)

A. Obtain equipment and take to room

B. Identify patient and requested blood tests by comparing requisition and identification bracelet

(NOTE: Usually a laboratory technician has brought the requisition to the patient's room.)

C. Identify yourself to patient and/or family

D. Explain procedure to patient

E. Place wastebasket close to work area

F. Wash hands

G. Place all syringes in readily accessible area

H. Open package containing fresh injection cap; place in readily accessible area

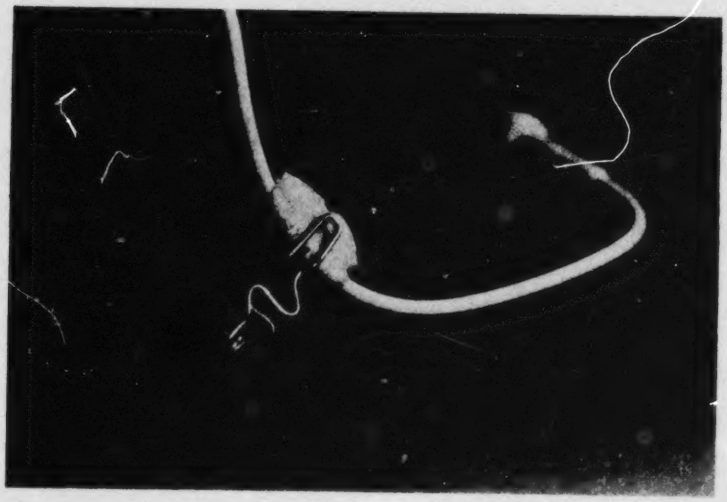
(NOTE: Keep inside packaging sterile and leave cap on packaging.)

I. Open povidone iodine prep sponges; place in readily accessible area

J. Clamp catheter with cannula clamp (Figure 11)

(NOTE: Protect the catheter from possible injury by placing an appropriate material, such as tape or a 2x2, between the clamp and catheter.)

FIGURE 11



K. Remove injection cap

(NOTE: This cap will unscrew.)

(CAUTION: Be very careful to avoid touch contamination.)

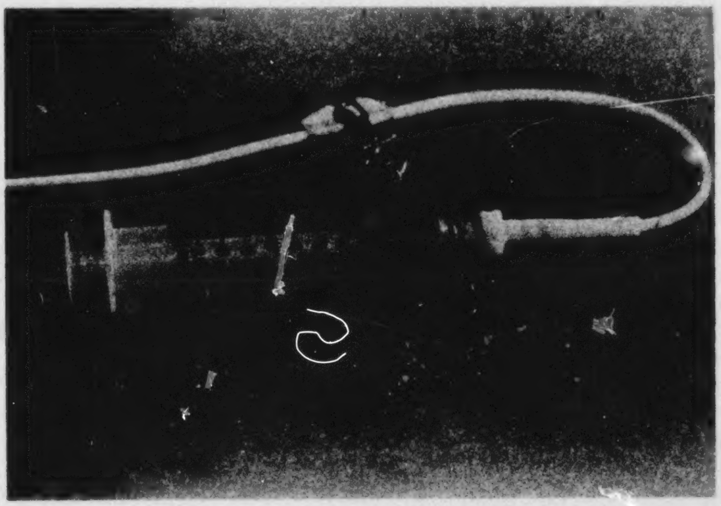
L. Cleanse tip of catheter using prep sponge (Figure 12)

FIGURE 12

JOB SHEET #10

M. Connect 10-milliliter syringe to catheter (Figure 13)

FIGURE 13



N. Remove cannula clamp

(NOTE: Keep clamp near catheter.)

O. Withdraw at least 8 milliliters of solution and blood from catheter

(NOTE: This process removes the heparin flush solution from the catheter.)

P. Have patient perform the following procedures if aspiration is difficult or impossible

1. Turn onto left side
2. Raise arms above head
3. Perform Valsalva's maneuver if not contraindicated

Q. Clamp catheter with cannula clamp as last 1/2 milliliter is being withdrawn

R. Remove syringe and discard

S. Cleanse tip of catheter with prep sponge

T. Connect appropriate size syringe for amount of blood to be drawn for all lab work

JOB SHEET #10

U. Remove cannula clamp

V. Withdraw appropriate amount of blood

W. Clamp catheter with cannula clamp as last 1/2 milliliter blood is being withdrawn

X. Remove syringe containing blood; hand to laboratory technician

Y. Cleanse tip of catheter with prep sponge

Z. Connect syringe containing normal saline to catheter

AA. Remove cannula clamp

BB. Inject normal saline

CC. Clamp catheter with cannula clamp as last 1/2 milliliter of normal saline is being injected

DD. Remove syringe and discard

EE. Cleanse tip of catheter with prep sponge

FF. Connect syringe containing heparin flush to catheter

GG. Remove cannula clamp

HH. Inject heparin flush solution

II. Clamp catheter with cannula clamp as last 1/2 milliliter of heparin solution is being injected

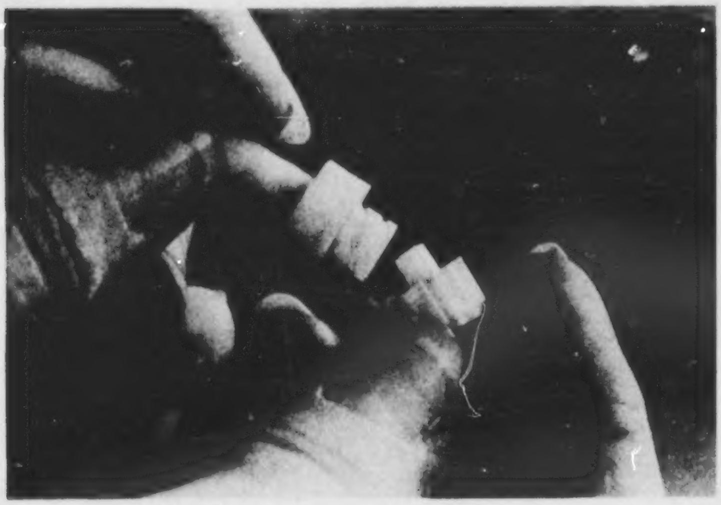
JJ. Remove syringe and discard

KK. Cleanse tip of catheter with prep sponge

JOB SHEET #10

LL. Place new injection cap securely on catheter tip (Figure 14)

FIGURE 14



MM. Remove cannula clamp from catheter

(NOTE: Clamp must be kept in a readily accessible place. It may be taped to bedside table or head of bed.)

NN. Wash hands before leaving room

OO. Document your observations and actions on proper chart form

SPECIAL CATHETERS
UNIT XIII

JOB SHEET #11--ADMINISTER MEDICATION THROUGH HICKMAN CATHETER

I. Equipment and materials

A. Two syringes, 10 ml size with 23-gauge needle, containing 8 ml normal saline

B. Syringe, 10 ml size containing 6 ml heparin flush solution

C. Prescribed medication in appropriate type and volume of fluid

D. Appropriate IV tubing

E. At least four povidone iodine prep sponges

F. Tape

II. Procedure

(NOTE: Strict aseptic technique must be used throughout this procedure, and touch contamination must be carefully avoided.)

A. Obtain equipment and take to room

B. Follow proper procedure to identify patient and medication

C. Identify yourself to patient and/or family

D. Explain procedure to patient

E. Wash hands

F. Place syringes in readily accessible area

G. Set up and fill IV tubing with medication solution, and suspend from IV pole

H. Open povidone iodine prep sponges and place in readily accessible area

I. Clamp catheter with cannula clamp

(NOTE: Protect the catheter from possible injury by placing an appropriate material, such as tape or gauze 2x2, between the clamp and catheter.)

J. Cleanse injection cap with prep sponge

K. Insert into injection cap needle and syringe containing normal saline

JOB SHEET #11

L. Remove cannula clamp

(NOTE: Keep clamp in readily accessible area.)

M. Inject normal saline

N. Clamp catheter with cannula clamp as last 1/2 milliliter is injected

O. Remove syringe from needle and discard syringe

P. Connect distal tip of IV tubing to needle; secure with tape

Q. Remove cannula clamp

(NOTE: Keep clamp in readily accessible area.)

R. Set flow control to appropriate rate for medication to be infused

S. Monitor flow frequently

(NOTE: If the container should empty and be left empty for a considerable time, there is a chance that the catheter may clot off.)

T. Turn flow-control clamp off as soon as all medication is infused

U. Clamp catheter with cannula clamp

V. Disconnect IV tubing from needle

W. Connect to needle 10-milliliter syringe containing normal saline

X. Remove cannula clamp

(NOTE: Keep clamp in readily accessible area.)

Y. Inject normal saline

Z. Clamp catheter with cannula clamp as last 1/2 milliliter of normal saline is injected

AA. Remove syringe from needle and discard

BB. Connect syringe containing heparin flush solution to needle

CC. Remove cannula clamp

(NOTE: Keep clamp in readily accessible area.)

DD. Inject heparin flush solution

EE. Clamp catheter with cannula clamp as last 1/2 milliliter of heparin flush is injected

JOB SHEET #11

FF. Remove syringe and needle and discard properly

(NOTE: Strict aseptic technique must be used throughout procedure and touch contamination must be carefully avoided.)

GG. Remove cannula clamp from catheter

HH. Wash hands before leaving room

II. Document your observations and actions on proper chart form

SPECIAL CATHETERS
UNIT XIII

TEST

NAME ________________________________ SCORE ______________

1. Match terms associated with special catheters to their correct definitions. Write the correct numbers in the blanks. Terms and definitions continued on the next page.

_____a. Use of a fluoroscope (type of X ray) for diagnosis or insertion of special devices

_____b. Pertaining to forces involved in circulating blood through the body

_____c. Sticky, gummy, thick in consistency

_____d. Slender metal device used to stiffen a catheter

_____e. Having a higher osmotic pressure than a compared solution

_____f. Organic compound in which carbon has been replaced by silicon

_____g. Device for controlling, directing, and placing a tube into a blood vessel

_____h. Main lymph duct of body

_____i. Mass of undissolved matter present in blood

_____j. To bring out or draw forth

_____k. Polymeric substance with elastic properties similar to rubber

_____l. Triangular area anterior to and below the elbow

_____m. State of being freely open

_____n. Withdrawal by suction of fluids or gases from a cavity

_____o. Located at or pertaining to the periphery; occurring away from the center

_____p. Nearest to point of attachment or origin

1. Antecubital fossa
2. Aspiration
3. Thoracic duct
4. Fluoroscopy
5. Elastomer
6. Elicit
7. Embolus
8. Hemodynamic
9. Hypertonic
10. Introducer
11. Patency
12. Viscous
13. Proximal
14. Silicone
15. Stylet
16. Peripheral

TEST

______q. Farthest from point of attachment or center

______r. Smooth, toothless clamp

______s. Having the characteristics of a substance formed by a combination of two or more molecules of the same substance

______t. Hollow tube inserted into a vein for injection of fluids

17. Cannula clamp
18. Polymeric
19. Distal
20. Catheter

TEST

2. Identify types of inside-the-needle central venous catheters. Write the correct names in the blanks.

Catheter type	Characteristics	Insertion	Uses
a. ____________________ ____________________	Soft synthetic rubber Stiffened by spring wire stylet	Venipuncture made with large-gauge introducer needle Catheter is threaded through introducer into vein Introducer needle removed from vein but small portion left in subcutaneous tissue Catheter inserted through subclavian vein into superior vena cava or right atrium	Delivering viscous fluids Delivering hypertonic fluids Delivering drugs to large central veins Long-term IV therapy As a heparin lock
b. ____________________ ____________________	Soft synthetic rubber Coiled on a drum device (spool) with a large-gauge slotted needle without back bevel Stiffened by spring wire stylet	Venipuncture made with large-gauge slotted needle Catheter is threaded through needle into vein Needle and drum device are removed completely Catheter is inserted through vein at antecubital fossa, jugular, or subclavian vein into superior vena cava or right atrium Catheter hub sutured in place	Delivering viscous fluids Delivering hypertonic fluids Delivering drugs to large central veins Long-term IV therapy As a heparin lock
c. ____________________ ____________________	Stiff, nonpliable plastic Large-gauge catheter	Venipuncture made with large-gauge needle Catheter is threaded through needle into vein Needle is removed from skin but left over catheter ouside skin Catheter is inserted through jugular or subclavian area into superior vena cava or right atrium Catheter hub sutured in place	Monitoring hemodynamic status Delivering viscous fluids Delivering hypertonic fluids Delivering drugs to large central veins Long-term IV therapy

TEST

3. Distinguish among complications of insertion and maintenance of inside-the-needle catheters. Write the name of the correct complication in the blanks.

Complication	Characteristics	Cause	Sign	Symptoms	Nursing Interventions	Treatment
a. ______	Air, blood, or IV fluid accumulates in pleural space, resulting in partial or complete collapse of lung on insertion side	Penetration of pleural space by needle and/or catheter during insertion	Dyspnea; cyanosis; loss of breath sounds on insertion side	Chest pain	Assess breath sounds at least twice a shift for first twenty-four hours; obtain order for X-ray to confirm placement	Removal of catheter; insertion of of chest tube on insertion side
b. ______	Formation of a clot in insertion vein and/or its connecting veins with accompanying sclerosis	Use of polyethylene catheter instead of silicone catheter	Edema of face or extremity on insertion side; venous disention	Pain in neck, face, or extremity on insertion side	Monitor patient for possible signs of thrombus	Removal of catheter and administration of anticoagulants
c. ______	Catheter contaminated by microorganisms	Transferring microorganisms from another source, such as the hands to the IV system	Fever; swelling and possible purulent drainage at insertion site	None	Maintain strict aseptic technique during insertion, dressing, and/or tubing change	Removal of catheter; culture of tip and blood with administration of appropriate antibiotics
d. ______	Catheter clogged by blood clot	Not changing solution container promptly; inadequate flushing with heparin solution when used as heparin lock	Sluggish or nonrunning IV solution; inability to irrigate catheter	None	Properly maintain IV system by changing solution promptly and by adequate flushing; notify physician	Removal of catheter
e. ______	Air enters venous system	Opening of system to air	Dyspnea; cyanosis; decreased BP; syncope; loud continuous churning sound heard over precordium	Chest pain	Secure all connections in IV system	Place patient on left side in modified Trendelenberg position

TEST

Complication	Characteristics	Cause	Sign	Symptoms	Nursing Interventions	Treatment
f. ______________ ______________	Loss of blood; backflow of blood through IV system	Accidental separation of IV system	Blood on bed or floor	None	Secure all connections in the IV system; notify physician	Replace blood if deemed necessary by physician
g. ______________ ______________	Artery in neck or chest is penetrated; can result in formation of mediastinal hematoma	Puncture of artery by needle during insertion	Rapid return of bright red blood upon needle insertion	None	None	Immediate removal of needle; application of pressure over insertion site
h. ______________ ______________	Inflammation of vein wall	Irritation of vein by catheter	Redness at insertion site, which can extend up length of vein; swelling; warmth at insertion site, which can extend up length of vein	Pain at insertion site, which can extend up vein	Apply warm moist pack if catheter is inserted peripherally; elevate extremity; encourage mild range of motion	Heat; elevation and mild range of motion if inserted peripherally; removal of catheter if conservative measures not adequate
i. ______________ ______________	Lymph node is penetrated, resulting in a leakage of lymph fluid outside of lymph system	Puncture of lymph system in chest by needle during insertion	Leakage of clear fluid as insertion site	None	Monitor dressing for signs of leaking fluid	Removal of catheter; application of pressure over insertion site
j. ______________ ______________	Piece of catheter enters venous circulation	Shearing off of a piece of catheter during insertion or anytime the catheter is withdrawn back through needle	Dependent upon where piece lodges can vary from dyspnea to syncope	None	Secure needle guard over bevel of needle and check every time dressing is changed	Surgical removal under floroscopy by guide wire to thoracotomy

TEST

4. Select from the following list nursing responsibilities and interventions with regard to inside-the-needle catheters. Write an "X" in the blank before each correct answer.

_____ a. Change tubing when dressing is changed

_____ b. Instruct patient to notify nurse if problems occur with equipment or at insertion site

_____ c. Apply temporary dressing

_____ d. Monitor vital signs as ordered

_____ e. Explain procedure to patient and family if they ask

_____ f. Answer any questions and correct misconceptions

_____ g. Avoid transfusing blood through line if polyethylene catheter is in place

_____ h. Enlist patient's cooperation, if possible, by instructing patient to keep head turned away from insertion side during insertion; keep hands away from site; take a deep breath and then bear down as if trying to have a bowel movement when so instructed; remain very still during insertion

_____ i. Obtain signed consent form if physician orders it

_____ j. Assemble equipment for physician and then resume previous activity

_____ k. Explain all procedures to patient and family

_____ l. Instruct patient to stay in bed

_____ m. Monitor for signs and symptoms of complications; notify physician if necessary

_____ n. Change tubing every twenty-four hours

_____ o. Monitor vital signs during insertion and every fifteen minutes for at least one-half hour after insertion

_____ p. Apply permanent dressing only if physician does not apply it

_____ q. Do not alarm patient by explaining possible problems

_____ r. Instruct patient not to tamper with any part of system or dressing

_____ s. Change dressing only if ordered by physician

_____ t. Elicit patient understanding

_____ u. Obtain necessary equipment before physician comes to perform insertion

TEST

______v. Obtain signed consent form

______w. Administer all medications through central venous line

______x. Assist with insertion

______y. Change dressing and care for insertion site as per hospital policy

______z. Instruct patient to turn flow rate up if it slows down and to tell nurse next time he or she is in room

______aa. Use in-line filter if ordered

______bb. Instruct patient in how to resume mobility

______cc. Apply permanent dressing

______dd. Order and make sure chest X ray is taken

______ee. Use great care if giving medications through line

______ff. Use fresh tubing for each IV medication

______gg. Use in-line filter

______hh. Avoid multiple punctures into line

______ii. Remove central venous catheter

______jj. Avoid injections under high pressure if silicone catheter is in place

5. Discuss the Hickman catheter.

a. Characteristics

____

____

b. Insertion

____

____

____

____

____

c. Uses

____

____

TEST

6. Select from the following list nursing responsibilities and interventions with regard to the Hickman catheter. Write an "X" in the blank before each correct answer.

______ a. Explain procedure to patient and family if they ask

______ b. Use injection cap until it is worn out

______ c. Obtain signed consent form if ordered

______ d. Explain catheter and procedure to patient and family before insertion

______ e. Obtain and know policy and procedure for drawing blood, administering medications, and dressing and site care

______ f. Obtain signed consent form

______ g. Obtain any clamp available and keep at bedside

______ h. Maintain adequate supply of injection caps if catheter is used as a heparin lock

______ i. Perform dressing care after return from surgery

______ j. Discard old cap and apply new injection cap whenever cap is removed

______ k. Maintain adequate supply of alcohol prep sponges

______ l. Obtain and make sure a cannula clamp is available and readily accessible

______ m. Cleanse injection cap thoroughly with alcohol before insertion of needle

______ n. Protect with appropriate material catheter area to be clamped

______ o. Check for and prevent drug and/or drug/solution incompatibilities

______ p. Maintain adequate supply of povidone iodine prep sponges

______ q. Use strict aseptic technique whenever using catheter

______ r. Flush catheter at least once per day with heparin flush solution

______ s. Cleanse injection cap thoroughly with povidone iodine sponges before insertion of needle

______ t. If catheter is being used as heparin lock, flush as per hospital policy at least twice per day with heparin solution

TEST

(NOTE: Test questions 7 and 8 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

7. Analyze a complication associated with central venous catheter.

8. Demonstrate the ability to

   a. Apply temporary dressing over inside-the-needle catheter.

   b. Assist with insertion of inside-the-needle catheter.

   c. Apply dressing after confirmation of placement of inside-the-needle catheter.

   d. Change dressing and care for insertion site for inside-the-needle catheter--technique #1.

   e. Change dressing and care for insertion site for inside-the-needle catheter--technique #2.

   f. Perform daily tubing and filter change on central venous line.

   g. Remove central venous catheter.

   h. Change dressing for peripheral silicone elastomer central venous catheter.

   i. Perform dressing care for Hickman catheter insertion and exit sites.

   j. Draw blood through Hickman catheter.

   k. Administer medication through Hickman catheter.

SPECIAL CATHETERS
UNIT XIII

ANSWERS TO TEST

1. a. 4
   b. 8
   c. 12
   d. 15
   e. 9
   f. 14
   g. 10
   h. 3
   i. 7
   j. 6
   k. 5
   l. 1
   m. 11
   n. 2
   o. 16
   p. 13
   q. 19
   r. 17
   s. 18
   t. 20

2. a. Silicone elastomer, Centrasil
   b. Silicone elastomer, Intrasil
   c. Polyethylene

3. a. Pneumothorax or hemothorax
   b. Venous thrombosis
   c. Catheter contamination
   d. Catheter occulusion
   e. Air embolus
   f. Blood loss
   g. Arterial puncture
   h. Phlebitis
   i. Thoracic duct puncture
   j. Catheter embolus

4. b, c, f, g, h, k, m, n, o, r, t, u, v, x, y, bb, cc, dd, ee, gg, hh, ii, jj

ANSWERS TO TEST

5. Discussion should include the following
    a. Characteristics
        1. Is large gauge
        2. Is composed of polymeric silicone rubber
    b. Insertion
        1. Is done in surgery under fluoroscopy
        2. Is through an incision over subclavian vein isolating the cephalic vein
        3. Is brought under and out of skin approximately 4 to 8 inches below insertion site (proximal tip)
        4. Is inserted into right atrium (distal tip)
        5. Is anchored in place in subcutaneous tissue with Dacron felt cuff that lies under skin
    c. Uses
        1. Administering fluids or drugs
        2. As a heparin lock
        3. Drawing blood
        4. Monitoring hemodynamic status
6. d, e, f, h, i, j, l, n, o, p, q, s, t
7. Evaluated to the satisfaction of the instructor
8. Performance skills evaluated to the satisfaction of the instructor

PARENTERAL NUTRITION
UNIT XIV

UNIT OBJECTIVE

After completing this unit, the student should be able to safely and properly administer parenteral hyperalimentation. The student should also be able to practice good and safe nursing care for the patient receiving parenteral hyperalimentation. This knowledge will be shown by completing the assignment sheets, job sheet, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with parenteral nutrition to their correct definitions.
2. Select from a list facts about calories.
3. Distinguish among facts about essential body nutrients.
4. Discuss effects of insufficient intake of essential body nutrients.
5. Select from a list laboratory values indicating negative nitrogen balance.
6. Discuss parenteral hyperalimentation.
7. Match additives used in parenteral hyperalimentation to their roles in the body.
8. List conditions that make patients candidates for parenteral hyperalimentation.
9. Distinguish between facts associated with peripheral and central venous hyperalimentation.
10. Discuss beginning therapy with central venous hyperalimentation.
11. Distinguish between signs and symptoms of phlebitis and infiltration.
12. Match complications of central venous hyperalimentation to their correct descriptions.
13. Select from a list nursing interventions with regard to central venous hyperalimentation.
14. Discuss lipids as related to parenteral nutrition.
15. List the two types of lipids available for parenteral nutrition.
16. Discuss considerations for administration of lipids.
17. List nursing interventions with regard to lipids.

OBJECTIVE SHEET

18. Implement correct nursing actions with central venous hyperalimentation.

19. Demonstrate the ability to administer a medication through central venous line.

PARENTERAL NUTRITION
UNIT XIV

SUGGESTED ACTIVITIES

I. Suggested activities

A. Obtain equipment to supplement unit.

1. One hyperalimentation solution container for each student

   (NOTE: Unless performing the procedure in the actual clinical setting, strict sterility is not a must in these classes. The containers used in previous classes may be reused.)

   (CAUTION: The concept of aseptic technique must be constantly reinforced.)

2. Two IV tubings for each student
3. One in-line filter for each student

   (NOTE: These filters are expensive and can be used only once.)

4. One extension tubing for each student
5. Two piggyback medication solution containers for each student
6. One Y-connector for each student
7. Container to be used to collect waste solution
8. Alcohol sponges
9. One 10-milliliter syringe for each student
10. IV poles
11. Toweling or other absorbent material

    (NOTE: Toweling is used to wipe up any spills.)

B. Lay out equipment for ease of use.

C. Invite a hyperalimentation nurse specialist to speak to class.

D. Pretest students to assess their present knowledge of subject.

E. Provide students with objective sheet.

F. Provide students with information, assignment, and job sheets.

G. Discuss unit and specific objectives.

SUGGESTED ACTIVITIES

H. Discuss information sheet.

I. Individualize instruction for students with special needs.

J. Discuss personal experiences as related to parenteral nutrition.

K. Discuss assignment sheets.

L. Demonstrate and discuss procedures outlined in job sheet.

(NOTE: There is great controversy concerning this procedure. Use your own discretion in teaching this material.)

M. Give test.

N. Discuss test.

O. Reteach if necessary.

II. Instructional materials

A. Objective sheet

B. Suggested activities

C. Information sheet

D. Assignment sheets

1. Assignment Sheet #1--Complete a Parenteral Nutrition Crossword Puzzle

2. Assignment Sheet #2--Implement Correct Nursing Actions with Central Venous Hyperalimentation

E. Answers to assignment sheets

F. Job sheet #1--Administer a Medication Through Central Venous Line

G. Test

H. Answers to test

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PARENTERAL NUTRITION
UNIT XIV

INFORMATION SHEET

I. Terms and definitions (Assignment Sheet #1)

A. Amino acid--One of a large group of organic compounds marked by the presence of both an amino and carboxyl group

B. Anabolism--Building up of body substance by which a cell takes from the blood substances required for repair and growth

C. Catabolism--All processes in which complex substances are converted into simpler substances, usually with release of energy

D. Coagulopathy--Any disorder of blood coagulation

E. Distal--Farthest from the point of attachment

F. Diuresis--Formation and secretion of large amounts of urine

G. Deoxyribonucleic acid (DNA)--A complex protein

H. Glycosuria--Presence of sugar in urine

I. Hepatomegaly--Enlargement of liver

J. Hyperlipidemia--Excess fat in subcutaneous tissue

K. Hypertonic--Having a higher osmotic pressure than a compared solution

L. Ion--Atom or group of atoms having an electrical charge

M. Nitrogenous--Pertaining to or containing nitrogen

N. Osmotic pressure--Pressure that develops when two solutions of different concentrations are separated by a semipermeable membrane

O. Parenteral--Denoting any route other than gastrointestinal

EXAMPLES: Intravenous, intramuscular, subcutaneous, mucosal

P. Paresthesia--Sensation of numbness, prickling, or tingling

Q. Pathophysiological--Disease or malfunction of a body function

R. Peripheral--Away from the center

S. Sclerosis--Thickening and hardening of the layers of a blood vessel

T. Splenomegaly--Enlargement of spleen

INFORMATION SHEET

U. Thrombocytopenia--Decrease in number of platelets in circulating blood

V. Toxin--Poisonous substance produced by bacteria

II. Facts about calories

A. Are units of measurement of energy or heat production

B. Are required daily as a fuel source for energy

C. Intake deficit results in use of stored body fuel for energy

D. Are found in carbohydrates, proteins, and fats

III. Facts about essential body nutrients

A. Carbohydrates

1. Are source of immediate cell fuel

(NOTE: Glucose from carbohydrates is the primary source of energy used by the brain.)

2. Are found in sugars and starches

3. Are stored in limited amounts in muscles and liver

B. Proteins

1. Are composed of complex nitrogenous compounds

2. Convert in body, producing amino acids

(NOTE: Amino acids are the only form of protein absorbed in the body.)

3. Form primary structural component of body cells

4. Are essential for growth, tissue building, and tissue repair

5. Are fundamental elements of all body systems

6. Are stored in body as lean muscle mass, not a directly usable form

C. Fats

1. Are source of reserve fuel for body

2. Are stored in adipose tissue

3. Provide a concentrated source of energy

4. Convert in body, producing fatty acids and glycerol, which is a type of alcohol

INFORMATION SHEET

5. Constitute important part of cell membrane and some body tissues

6. Are essential for growth and development

IV. Effects of insufficient intake of essential body nutrients

A. Carbohydrates

1. Causes conversion of ingested protein for use as energy

(NOTE: Ingested protein used for energy cannot also be used to build tissue.)

2. Causes less efficient functioning of organs such as the brain

B. Proteins

(NOTE: Insufficient intake of protein is usually referred to as *negative nitrogen balance* and will often be used as the criterion for the use of parenteral nutrition.)

1. Adversely affects all body systems

2. Increases chance of pathophysiological complications

C. Fats

1. Contributes to deficiencies of fat-soluble vitamins A, D, E, and K

2. Decreases functioning of body cells

(NOTE: Fats are an integral part of the structure of all cells.)

V. Laboratory values indicating negative nitrogen balance

(NOTE: These values will frequently be used to determine whether nutritional support by the parenteral route should be used.)

A. Decrease of serum albumin below 3.5 g/100 ml

B. Decrease in lymphocyte count below 1800/mm^3

C. Decrease in serum transferrin below 180 mg/100 ml

D. Increase in twenty-four-hour urine creatinine clearance above 15 to 25 mg/kg body weight

E. Increase in creatinine height index

(NOTE: The creatinine height index measurement is calculated by comparing the patient's total twenty-four-hour urinary creatinine in milligrams against the twenty-four-hour urinary creatinine of a healthy person of the same height at an ideal weight.)

INFORMATION SHEET

VI. Parenteral hyperalimentation

- A. Provides essential nutrients by IV route
    - 1. Carbohydrates in the form of dextrose

      (NOTE: The percentage of dextrose can vary from 5 percent to 50 percent.)
    - 2. Proteins in the form of amino acids

      (NOTE: The percentage of amino acids can vary from 2.5 percent to 10 percent.)
    - 3. Fats in the form of lipid emulsions
    - 4. Electrolytes, vitamins, and trace elements
- B. Provides only partial nutrient support by peripheral infusion
- C. Provides complete nutrient support by central venous infusion

VII. Additives used in parenteral hyperalimentation and their roles in the body

- A. Potassium
    - 1. Required for cellular activity
    - 2. Required for tissue synthesis
    - 3. Necessary for glucose to enter cells
- B. Sodium
    - 1. Helps control water distribution
    - 2. Required to maintain fluid balance
- C. Chloride
    - 1. Helps regulate acid/base balance
    - 2. Required to maintain osmotic pressure
- D. Calcium
    - 1. Required for development of bones and teeth
    - 2. Aids in blood clotting
    - 3. Aids in conduction of electrical impulse across cell

INFORMATION SHEET

E. Phosphate

   1. Minimizes threat of peripheral paresthesia
   2. Aids in maintaining acid/base balance

F. Magnesium

   1. Aids in absorption and utilization of carbohydrates and proteins
   2. Aids in regulation of body temperature and neuromuscular contraction

G. Acetate

   1. Helps prevent metabolic acidosis
   2. Given in combination with potassium or sodium

H. Folic acid

   1. Necessary for DNA formation
   2. Promotes growth and development

I. Vitamin D

   1. Essential for bone metabolism
   2. Aids in maintaining serum calcium levels

J. Vitamin B complex

   1. Aids in final absorption of carbohydrates and proteins
   2. Stimulates appetite and biliary action

K. Vitamin K

   1. Helps prevent bleeding disorders
   2. Necessary for formation of prothrombin

L. Vitamin C

   1. Aids in wound healing
   2. Essential in maintenance of intracellular cement

M. Trace elements--zinc, manganese, copper, and chromium

   1. Necessary for red blood cell synthesis
   2. Aids in wound healing

INFORMATION SHEET

VIII. Conditions that make patients candidates for parenteral hyperalimentation

A. Burns

(NOTE: A severely burned patient can require as many as 10,000 calories per day to promote healing and replace massive calorie loss.)

B. Surgery

(NOTE: Hyperalimentation is used both pre- and postoperatively to build up and/or maintain body tissues.)

C. Congenital anomalies in the newborn

(NOTE: Parenteral hyperalimentation is usually temporary until another method can be found for nutritional support or until corrective surgery is performed.)

D. Bowel diseases such as Crohn's disease, ulcerative colitis, and radiation colitis

E. Central nervous system dysfunctions

EXAMPLES: 1. Severe head injuries

2. Nerve disorders that affect swallowing or bowel function

F. Acute pancreatitis

G. Short bowel syndrome

(NOTE: Short bowel syndrome is usually the result of surgical procedures.)

H. Anorexia nervosa

I. Bowel fistulas

J. Acute renal failure

K. Chemotherapy with resultant loss of appetite, nausea, or diarrhea

L. Cancer

IX. Facts associated with peripheral and central venous hyperalimentation

A. Peripheral hyperalimentation

(NOTE: Peripheral hyperalimentation is also known as *peripheral parenteral nutrition* or *PPN.*)

1. Used to spare body protein
2. Used for short periods of time

EXAMPLE: Seven to ten days

INFORMATION SHEET

3. Cannot meet total nutritional requirements
4. Used if patient was well nourished before present nutritional deficit
5. Used if there is only slight negative nitrogen balance
6. Is a solution of 2.5 to 5.5 percent amino acids and 5 to 10 percent dextrose
7. Can provide 50 to 100 grams protein daily
8. Can provide small to moderate amounts of calories
9. Is infused through peripheral IV site
10. Addition of all additives is possible
11. Is a hypertonic solution

B. Central venous hyperalimentation

(NOTE: Central venous hyperalimentation is commonly called *total parenteral nutrition* or *TPN*.)

1. Used to provide all nutrients for function and maintenance of all body systems
2. Used if nutritional deficit will extend beyond one week
3. Used for indefinite periods of time

   EXAMPLE: One month to two years

4. Used when severe nutritional depletion is present
5. Is a solution of 2.5 to 10 percent amino acids and 25 to 50 percent dextrose
6. Can provide 6 to 19 grams nitrogen or 50 to 120 grams protein per day
7. Can provide moderate to large amounts of calories
8. Is infused only through central venous catheter
9. Addition of all additives is possible
10. Is a very hypertonic solution

INFORMATION SHEET

X. Beginning therapy with central venous hyperalimentation

   A. Therapy is usually begun with a 25 percent dextrose solution

   B. Dextrose concentration is increased to 50 percent as patient tolerance allows

   C. Therapy is begun with flow rates of 50 to 85 milliliters per hour, and increased as patient tolerance allows

   (NOTE: Flow rate may be increased to as high as 250 milliliters per hour.)

XI. Signs and symptoms of phlebitis and infiltration

(NOTE: Phlebitis and infiltration are common complications of peripheral parenteral nutrition.)

   A. Phlebitis

      1. Develops quickly

      EXAMPLE: Forty-eight hours

      2. Indicated by redness at insertion site and/or along length of vein, pain, and warmth over insertion area

      3. Promotes sclerosis of vein if infusion is continued

      4. Can ruin vein for any further IV therapy

   B. Infiltration

      1. Can cause tissue damage due to highly irritating solution

      2. Indicated by swelling at and around site, pain and/or burning, and coolness at site

      3. Increases chance of infection

      4. Can prevent use of that extremity for further IV therapy for long period of time

XII. Descriptions of complications of central venous hyperalimentation

   A. Metabolic

      1. Hyperglycemia

      (NOTE: Hyperglycemia is the most common complication of parenteral therapy.)

INFORMATION SHEET

a. Caused by too rapid infusion of solution for body to metabolize, thus causing high concentration of glucose in blood

(NOTE: A high concentration of glucose in the blood can occur at the beginning of therapy if dextrose concentration is too high or if flow rate is too rapid.)

b. Results in decreased serum insulin, glycosuria, and dehydration

(NOTE: This complication is further complicated by an accompanying metabolic acidosis.)

c. Indicated by headache, confusion, lethargy

(NOTE: This complication may progress to seizures and coma.)

2. Hypoglycemia

a. Occurs due to rapid decrease of glucose intake

b. Results in high levels of insulin in blood

(NOTE: The pancreas has adjusted to a high intake of glucose and has greatly increased its production of insulin. It will continue to do so for a long period of time.)

c. Caused by slowing or stopping of flow rate for a length of time, or by abrupt termination of therapy

(NOTE: To cause hypoglycemia, flow rate must be slowed or stopped for over one hour.)

(CAUTION: Hypoglycemia can occur if the solution container is allowed to run dry and a new container is not hung for a considerable length of time.)

d. Indicated by weakness, trembling, diaphoresis, hunger, apprehension, decreasing level of consciousness, convulsions

3. Electrolyte imbalance

a. Occurs due to lowered ion levels in blood

EXAMPLES: Potassium, chloride

b. Caused by inadequate intake of ions

(NOTE: Most patients on parenteral nutrition therapy have inadequate or no oral intake of these necessary electrolytes.)

c. Includes vague and nonspecific signs

(NOTE: Electrolyte imbalance can be confirmed only by laboratory determinations.)

INFORMATION SHEET

B. Local

1. Skin irritation or breakdown

   a. Occurs under dressing

   b. Caused by type of tape used or skin preparation solution used

   c. Indicated by redness and/or hives on skin under dressing, itching under dressing, tearing of skin when tape is removed

2. Infection

   a. Occurs at insertion site

   b. Caused by contaminated dressing

   c. Indicated by redness and/or swelling, warmth at insertion site, purulent drainage at insertion site

3. Infiltration

   a. Occurs at and surrounding insertion site

   b. Caused by penetration of vein wall by catheter

   c. Indicated by swelling at insertion site, pain in shoulder and arm on insertion side

C. Thrombogenic

1. Thrombophlebitis

   a. Occurs in insertion vein and/or vena cava

   b. Caused by low flow rate, infection, incorrect type of catheter, repeated punctures

   c. Results in injury to wall of vein and formation of clot along vein wall

   d. Indicated by swelling of arm and/or neck on insertion side; increase of venous tributaries along chest wall on insertion side; soreness and/or pain in neck, shoulder, and chest on insertion side

2. Thromboembolus

   a. Occurs in vessel containing tip of catheter

   EXAMPLES: Vena cava, right side of heart

   b. Caused by inadequate flow of solution through catheter by kinking of tubing or catheter, incompatibility of medications or of medication and solution, low flow rate

INFORMATION SHEET

c. Results in formation of clot inside and/or at tip of distal catheter

d. Indicated by inability to establish adequate flow rate

D. Systemic

1. Sepsis

a. Caused by introduction of microorganisms through IV system

b. Results in formation of toxins that damage small blood vessels

c. Indicated by fever, flushed warm and dry skin, rapid heart rate with bounding pulse, increased respirations, widening pulse pressure

2. Fluid overload

a. Caused by large amounts of fluid infused in short length of time with resultant dilation and decreased contractility of ventricles

b. Can result in pulmonary edema

c. Indicated by increased respirations without apparent cause, increased heart rate, dry hacky cough

3. Osmotic diuresis

a. Occurs when large amounts of fluid are infused rapidly, resulting in increased circulating volume

b. Results in increased blood flow through major organs, including kidneys, with resultant increased urine output

c. May result in tissue dehydration and resultant general dehydration

(NOTE: Tissue dehydration is due to the hypertonic solution pulling fluid from the tissues by osmosis.)

d. Results in increased loss of intracellular ions

e. Indicated by overload as first sign, greatly increased urine output, hyperglycemia; if allowed to continue, indicated by dehydration and/or hypovolemia

XIII. Nursing interventions with regard to central venous hyperalimentation (Assignment Sheet #2)

A. Explain purpose of all solutions to patient and family

B. Use careful handwashing technique whenever working with solution, tubing, or dressing

INFORMATION SHEET

C. Monitor prescribed flow rate carefully

(NOTE: Use an infusion pump if at all possible.)

D. Use a timing strip

(NOTE: To be able to quickly check on hourly volume delivered, use of a timing strip is important, even when using an infusion pump.)

E. Do not increase infusion rate by more than 10 percent at any time

(CAUTION: Never play "catch up.")

F. Monitor IV line for kinks and/or disconnections

G. Tape all connections securely in line

(NOTE: These connections must be kept to a minimum.)

H. Monitor for signs of metabolic complications

I. Obtain diabetic urine sugars at least every six hours

(NOTE: This is necessary during the first two weeks of therapy and whenever flow rate is increased. Always be consistent in the type of diabetic testing material used.)

(CAUTION: If the patient had been stable with a negative or 1+ urine sugar for days, and then suddenly spills a large amount of sugar, such as 3+ or 4+, suspect a hidden infection.)

J. Notify physician of urine sugar of 2+ or over

(NOTE: Often a sliding scale insulin coverage will be ordered until the body adjusts to the increased glucose.)

K. Monitor serum glucose levels and report abnormal values

L. Monitor vital signs, including temperature, every four hours during first two to three weeks of therapy, and then every eight hours

(NOTE: The development of a sudden and dramatic temperature spike can mean a contaminated solution.)

M. Follow strict aseptic technique during tubing and/or dressing change

N. Change dressing if possibility of contamination exists

O. Change dressing every forty-eight to seventy-two hours

(NOTE: Obtain and know your hospital's policy and procedure.)

P. Change all IV tubing at one time every twenty-four hours

INFORMATION SHEET

Q. Maintain closed IV line and system

R. Avoid any needle punctures of IV line

S. Inspect solution and container carefully before infusing

T. Refrigerate solution until ready for administration

U. Compare prescribed solution, using appropriate communication tool, to the solution label

V. Monitor for signs of fluid overload

W. Administer medication through line *only* if absolutely necessary (Job Sheet #1)

(NOTE: Obtain and know your hospital's policy for the administration of medication with hyperalimentation.)

X. Maintain accurate I & O; monitor continuing totals for excess or deficit

Y. Weigh patient daily

Z. Monitor insertion site and surrounding tissues for local and thrombogenic complications

AA. Document carefully, on the appropriate chart forms, all of your observations, assessments, and actions

XIV. Lipids as related to parenteral nutrition

A. Composed of soybean or safflower oil emulsions and purified egg phosphatides or phospholipids in glycerin in water

B. Used to prevent or correct deficiencies of essential fatty acids when oral intake is inadequate or impossible

C. Provide large amount of concentrated calories

(NOTE: Five hundred milliliters of 10 percent lipids provide 500 calories, and 500 milliliters of 20 percent lipids provide 1,000 calories.)

D. Appear milky white in color

(CAUTION: Lipids must never be agitated; due to their color, it is tempting to shake them. Agitation may cause the fat globules to aggregate.)

E. Are isotonic

F. Infused frequently with peripheral hyperalimentation to reduce irritation of vein due to hypertonic character of solution

INFORMATION SHEET

XV. Types of lipids available for parenteral nutrition

A. Intralipid

(NOTE: Intralipid must be infused within six hours. It is manufactured by Cutter Laboratories.)

B. Liposyn

(NOTE: Length of administration is unspecified. This product is manufactured by Abbott Laboratories.)

XVI. Considerations for administration of lipids

A. May be given by either peripheral or central venous routes

(CAUTION: Some hospitals do not allow anything to be added to a central venous line, including lipids.)

(NOTE: Be sure to obtain and know your hospital's policy regarding the administration of other products through a central venous line.)

B. Should be piggybacked into administration line as close to insertion site as possible

C. Must not be filtered

(NOTE: Lipid particles are large and will not pass through a filter.)

D. Must be hung higher than main solution

(NOTE: Lipid solution is lighter than water and will back up into other tubings. The use of greater pressure by gravity keeps the lipids from backing up or floating into other IV solutions.)

E. Are compatible with hyperalimentation solutions

F. Are not compatible with any medications

G. Can cause fat overload and untoward reactions

(NOTE: Signs and symptoms of fat overload are abdominal pain, hyperlipidemia, thrombocytopenia, transient increase in liver enzymes, coagulopathy, hepatomegaly, splenomegaly, and focal seizures. Signs and symptoms of untoward reactions are fever, chills, warm sensation, nausea, vomiting, dyspnea, and headache.)

XVII. Nursing interventions with regard to lipids

A. Explain the product and its use to patient and family

B. Maintain constant flow rate

(NOTE: Use infusion pump if possible.)

INFORMATION SHEET

C. Monitor patient's condition and vital signs closely during first infusion

D. Use strict aseptic technique whenever working with lipids

E. Inspect solution carefully to make sure that it has not separated

(NOTE: If separation of solution is noted, send it back to the pharmacy or central supply for an exchange.)

F. If fever and chills occur, stop infusion and notify physician

G. If solution is given to patient who is allergic to eggs, monitor for signs of anaphylaxis

H. Notify laboratory if lipids are infused within two hours prior to blood being drawn

(NOTE: The infusion of lipids can cause a transient increase of LDH and SGOT.)

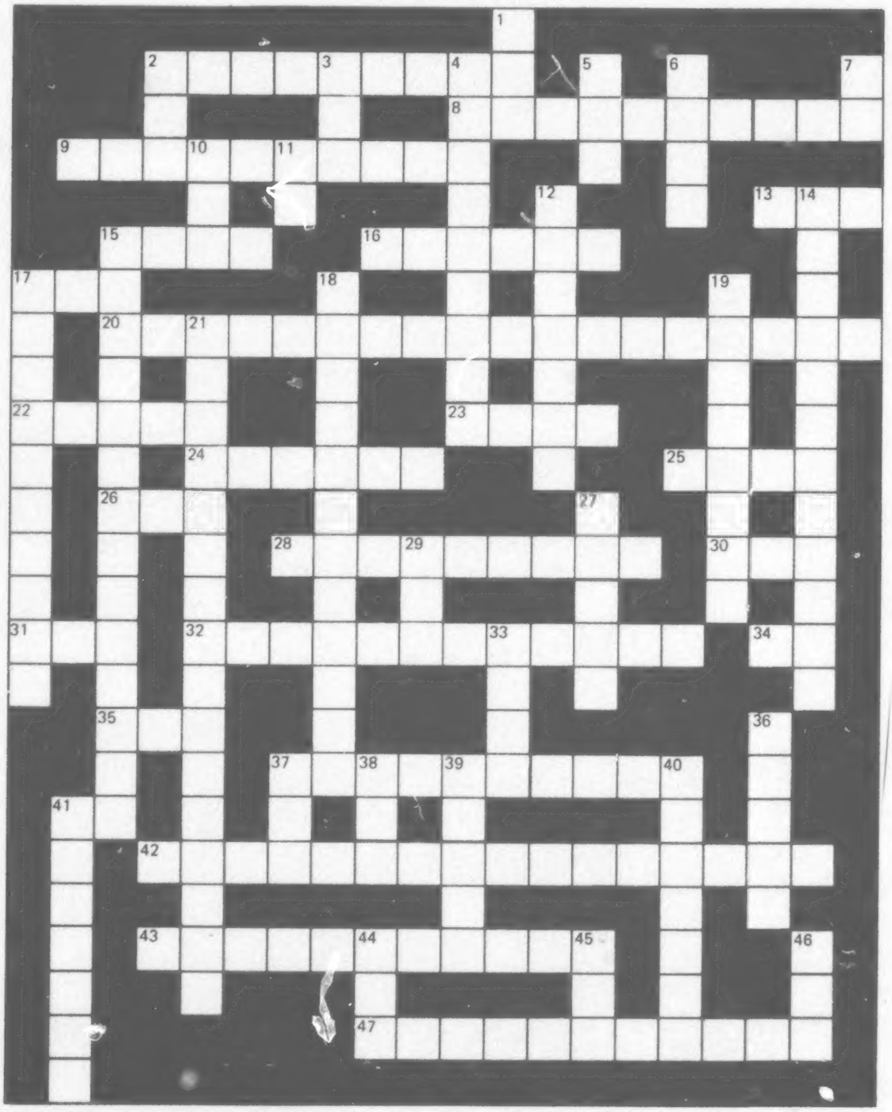
I. Document carefully, on appropriate chart forms, all of your observations, assessments, and actions

PARENTERAL NUTRITION
UNIT XIV

ASSIGNMENT SHEET #1--COMPLETE A PARENTERAL NUTRITION CROSSWORD PUZZLE

NAME ______________________________ SCORE ______________

By completing this crossword puzzle, you will be reinforcing your knowledge and grasp of the terms and definitions used in this unit. It is an entertaining exercise yet challenges you to think and remember. Clues are on the following page.



ASSIGNMENT SHEET #1

DOWN

1. Abbreviation for a medical group
2. What one breathes
3. Single unit
4. Thickening and hardening of the layers of a blood vessel
5. Source of reserve fuel for the body
6. Twelve inches
7. Abbreviation for *gram*
10. Atom or group of atoms having an electrical charge
11. Santa's laugh
12. Pressure that develops when two solutions of different concentrations are separated by a semipermeable membrane
14. Enlargement of liver
15. Excess fat in subcutaneous tissue
17. Denoting any route other than gastrointestinal
18. Enlargement of spleen
19. Formation and secretion of large amounts of urine
21. Decrease in number of platelets in circulating blood
27. Beginning
29. Nothing
33. Portion of a whole
36. Poisonous substance produced by bacteria
37. Six (Greek)
38. For each
39. Sign of spring
40. Unit used for measuring energy produced by food when oxidized by body
41. Primary structural component of body cells
44. Abbreviation for Republican Party
45. Past tense of *sit*
46. Abbreviation for deoxyribonucleic acid

ACROSS

2. Building up of body substance by which a cell takes from the blood substances required for repair and growth
8. All processes in which complex substances are converted into simpler substances, usually with a release of energy
9. Away from the center
13. Opposite of *he*
15. To sharpen
16. Stop, as in cardiac ______
17. To move by leverage
20. Disease or malfunction of a body function
22. Mistake
23. Epidermis
24. Gained access
25. Appear
26. Belief
28. One of a large group of organic compounds marked by the presence of both an amino and carboxyl group (2 words)
30. Gerund ending
31. Conjunction

ASSIGNMENT SHEET #1

32. Any disorder of blood coagulation
34. Abbreviation for *milliliter*
35. Abbreviation for *metabolism*
37. Having a higher osmotic pressure than a compared solution
41. Abbreviation for *Pennsylvania*
42. A complex protein acid
43. Pertaining to or containing nitrogen
47. Sensation of numbness, prickling, or tingling

PARENTERAL NUTRITION
UNIT XIV

ASSIGNMENT SHEET #2--IMPLEMENT CORRECT NURSING ACTIONS WITH CENTRAL VENOUS HYPERALIMENTATION

NAME ______________________________ SCORE ______________

This assignment sheet will help familarize you with the necessary nursing interventions for patients with hyperalimentation solution infusions.

Mrs. Dot C. Doe is a seventy-year-old patient receiving central venous hyperalimentation because of necessary NPO for the healing of an intestinal fistula.

State your nursing actions for the following situations.

A. Urine sugar on third day after initiating therapy is 1+ at 2 A.M.

B. Blood sugar remains moderately elevated and physician orders 20 units of regular insulin added to solution on tenth day of therapy. At 2 P.M. you find Mrs. Doe very diaphoretic and barely able to talk.

C. The rate of infusion has been increased per physician's order to 200 milliliters an hour; you note on your I & O total that the patient's urine output has been 5,000 milliliters.

ASSIGNMENT SHEET #2

D. You make your hourly check of the flow rate and find that 400 milliliters have accidentally infused in one hour.

____

____

____

____

____

E. You make your initial patient assessment at beginning of shift and find that the solution is two hours behind schedule.

____

____

____

____

____

PARENTERAL NUTRITION
UNIT XV

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

											1 A								
			2 A	N	A	B	3 O	L	I	4 S	M		5 F		6 F				7 G
			I				N			8 C	A	T	A	B	O	L	I	S	M
	9 P	E	R	10 I	P	11 H	E	R	A	L			T		O				
				O		O				E		12 O			T		13 S	14 H	E
		15 H	O	N	E			16 A	R	R	E	S	T					E	
17 P	R	Y					18 S			O		M				19 D		P	
A		20 P	A	21 T	H	O	P	H	Y	S	I	O	L	O	G	I	C	A	L
R		E		H			L			I		T				U		T	
22 E	R	R	O	R			E			23 S	K	I	N			R		O	
N		L		24 O	P	E	N	E	D			C			25 S	E	E	M	
T		26 I	S	M			O						27 B			S		E	
E		P		B		28 A	M	I	29 N	O	A	C	I	D		30 I	N	G	
R		I		O			E		I				R			S		A	
31 A	N	D		32 C	O	A	G	U	L	O	33 P	A	T	H	Y		34 M	L	
L		E		Y			A				A		H					Y	
		35 M	E	T			L				R						36 T		
		I		O		37 H	Y	38 P	E	39 R	T	O	N	I	40 C		O		
	41 P	A		P		E		E		O					A		X		
	R		42 D	E	O	X	Y	R	I	B	O	N	U	C	L	E	I	C	
	O			N						I					O		N		
	T		43 N	I	T	R	O	44 G	E	N	O	U	45 S		R			46 D	
	E			A				O					A		I			N	
	I							47 P	A	R	E	S	T	H	E	S	I	A	
	N																		

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #2

A. 1. Continue routine diabetic urine sugars
   2. Notify oncoming shift of slight elevation

B. 1. Notify physician immediately
   2. Notify laboratory to draw blood sugar immediately
   3. Prepare to give extra glucose

C. 1. Notify physician
   2. Prepare to adjust flow rate to a decreased rate
   3. Prepare to administer a hypotonic fluid by another IV site

D. 1. Slow infusion to prescribed rate
   2. Notify physician
   3. Monitor patient for hyperglycemia, fluid overload, and osmotic diuresis
   4. Ascertain why large amount infused in such a short time and correct problem

E. 1. Reset to prescribed rate
   2. Relabel timing strip to reflect change of infusion schedule

PARENTERAL NUTRITION
UNIT XIV

JOB SHEET #1--ADMINISTER A MEDICATION THROUGH CENTRAL VENOUS LINE

(CAUTION: The administration of a medication through a central venous line is not always recommended due to the chance of incompatibilities and infection. Obtain and know your hospital's policy before following this procedure.)

I. Equipment

  A. Prescribed hyperalimentation solution

  B. Appropriate IV tubing

  C. In-line filter if not included as part of IV tubing

  D. Extension tubing

  E. Two 50-milliliter partial-fill IV solution containers

  F. Appropriate IV solution compatible with medication to be administered

  G. Appropriate pharmacy-prepared IV medication solution container

  H. Appropriate IV tubing for medication

  (NOTE: The use of a volume control device is appropriate.)

  I. Y-connector

  (NOTE: Special connectors without a rubber diaphragm are available.)

  J. Medication

  K. Alcohol sponge

  L. Appropriate-sized syringe

  (NOTE: The size is dependent upon the amount of solution used to dilute a powder, or the amount of medication in a dose.)

  M. Appropriate diluent for a powder medication

II. General procedure

  A. Check with pharmacist to determine compatibility of medication and IV solution, or any other IV solutions

  B. Obtain equipment and take to room

  C. Follow proper procedures to identify patient for administration of medication

  D. Identify yourself to patient and/or family and explain procedure

JOB SHEET #1

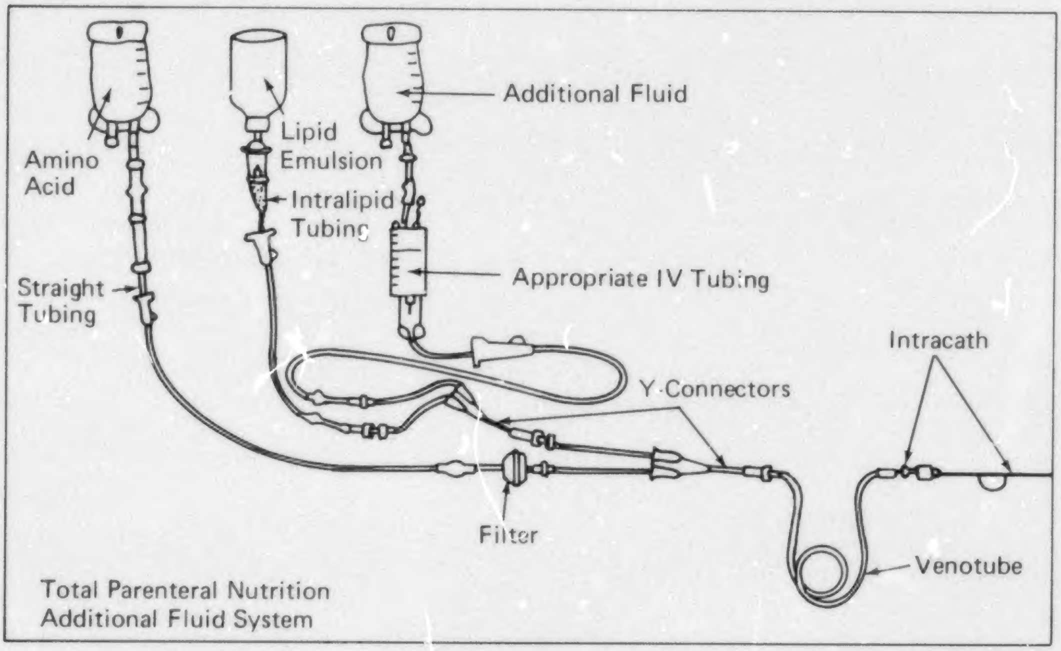
E. Wash hands

F. Set up all tubing (Figure 1)

(NOTE: All of the tubing must be prepared at one time and left as a closed system.)

(CAUTION: There should never be any "piggybacking" by needle into a central venous system.)

FIGURE 1



G. Change tubing down to central venous catheter

H. Discard used equipment in appropriate place

I. Wash hands before leaving room

J. Document all of your actions carefully on the appropriate chart form

III. Procedure for nurse-prepared piggyback solution

A. Prepare medication following all guidelines

B. Close flow control clamp on main solution

JOB SHEET #1

C. Open flow control clamp on medication solution and flush line with 20 to 30 milliliters of solution

D. Add medication to medication solution

E. Infuse medication at appropriate rate

F. Close flow control clamp on medication solution before air enters line

G. Open flow control clamp and flush line with 20 to 30 milliliters of medication-free solution

(NOTE: The use of a volume control device simplifies steps C through G and eliminates interruptions of line.)

H. Restart main solution at prescribed flow rate

(CAUTION: Interruption of flow of hyperalimentation for periods of over one hour is discouraged due to the possibility of hypoglycemia.)

Procedure for pharmacy-prepared piggyback solution

A. Place 50-milliliter partial-fill IV solution container on secondary tubing

B. Close flow control clamp on main solution

C. Open flow control clamp on secondary tubing and flush line with 20 to 30 milliliters of IV solution; close clamp

D. Remove partial-fill IV solution container and discard; place pharmacy-prepared medication container on secondary tubing

E. Open flow control clamp on secondary tubing and infuse medication at appropriate rate; close clamp when medication is infused

(NOTE: Turn medication solution off before air enters line.)

F. Remove pharmacy-prepared medication container and discard; place 50-milliliter partial-fill IV solution container on secondary tubing

G. Flush line with 20 to 30 milliliters of solution; close clamp and leave this container on the secondary line

H. Restart main solution at prescribed flow rate

(CAUTION: Interruption of the flow of hyperalimentation for periods of over one hour is discouraged due to the possibility of hypoglycemia.)

PARENTERAL NUTRITION
UNIT XIV

TEST

NAME ____ SCORE ________________

1. Match terms associated with parenteral nutrition to their correct definitions. Write the correct numbers in the blanks. Terms and definitions are continued on the next page.

_____ a. Disease or malfunction of a body function

_____ b. All processes in which complex substances are converted into simpler substances, usually with release of energy

_____ c. Pertaining to or containing nitrogen

_____ d. One of a large group of organic compounds marked by the presence of both an amino and carboxyl group

_____ e. Away from the center

_____ f. Building up of body substance by which a cell takes from the blood substances required for repair and growth

_____ g. Sensation of numbness, prickling, or tingling

_____ h. A complex protein

_____ i. Pressure that develops when two solutions of different concentrations are separated by a semipermeable membrane

_____ j. Denoting any route other than gastrointestinal

_____ k. Having a higher osmotic pressure than a compared solution

_____ l. Thickening and hardening of the layers of a blood vessel

_____ m. Presence of sugar in urine

_____ n. Formation and secretion of large amounts of urine

_____ o. Atom or group of atoms having an electrical charge

_____ p. Poisonous substance produced by bacteria

1. Amino acid
2. Anabolism
3. Catabolism
4. Sclerosis
5. Peripheral
6. Deoxyribonucleic acid (DNA)
7. Toxin
8. Glycosuria
9. Pathophysiological
10. Paresthesia
11. Hypertonic
12. Ion
13. Nitrogenous
14. Osmotic pressure
15. Parenteral
16. Diuresis

TEST

______q. Farthest from the point of attachment

______r. Excess fat in subcutaneous tissue

______s. Decrease in number of platelets in circulating blood

______t. Any disorder of blood coagulation

______u. Enlargement of liver

______v. Enlargement of spleen

17. Hyperlipidemia
18. Hepatomegaly
19. Distal
20. Coagulopathy
21. Splenomegaly
22. Thrombocytopenia

2. Select from the following list facts about calories. Write an "X" in the blank before each correct answer.

______a. Are required daily as a fuel source for energy

______b. Are complex compounds

______c. Are found in carbohydrates, proteins, and fats

______d. Body requirements exceed 1,500 per day

______e. Can be utilized by body without being digested

______f. Intake deficit results in use of stored body fuel for energy

______g. Body requirements are decreased by fever

______h. Are used as a source of energy basically during stress

______i. Are units of measurement of energy or heat production

3. Distinguish among facts about essential body nutrients. Write the correct numbers in the blanks. Facts are continued on the next page. Answers may be used more than once.

______a. Are stored in body as lean muscle mass, not a directly usable form

______b. Convert in body, producing fatty acids and glycerol, which is a type of alcohol

______c. Are composed of complex nitrogenous compounds

______d. Are stored in limited amounts in muscles and liver

______e. Are source of reserve fuel for body

1. Carbohydrates
2. Proteins
3. Fats

TEST

_____f. Form primary structural component of body cells

_____g. Provide a concentrated source of energy

_____h. Are found in sugars and starches

_____i. Constitute important part of cell membrane and some body tissues

_____j. Convert in body, producing amino acids

_____k. Are source of immediate cell fuel

_____l. Are fundamental elements of all body systems

_____m. Are stored in adipose tissue

_____n. Are essential for growth, tissue building, and tissue repair

_____o. Are essential for growth and development

4. Discuss effects of insufficient intake of essential body nutrients.

a. Carbohydrates--____

____

____

b. Proteins--____

____

____

c. Fats--____

____

____

5. Select from the following list laboratory values indicating negative nitrogen balance. Write an "X" in the blank before each correct answer.

_____a. Decrease in twenty-four-hour urine creatinine clearance below 15 mg/kg body weight

_____b. Decrease of serum albumin below 3.5 g/100 ml

_____c. Decrease in creatinine height index

TEST

______d. Increase in serum transferrin above 180 mg/100 ml

______e. Increase in twenty-four-hour urine creatinine clearance above 15 to 25 mg/kg body weight

______f. Increase in serum albumin above 3.5 g/100 ml

______g. Increase in creatinine height index

______h. Increase in lymphocyte count above 1800/mm^3

______i. Decrease in serum transferrin below 180 mg/100 ml

______j. Decrease in lymphocyte count below 1800/mm^3

6. Discuss parenteral hyperalimentation.

7. Match additives used in parenteral hyperalimentation to their roles in the body. Write the correct numbers in the blanks. Additives and roles are continued on the next page.

______a. Required for development of bones and teeth; aids in blood clotting; aids in conduction of electrical impulse across cell

______b. Helps prevent bleeding disorders; necessary for formation of prothrombin

______c. Minimizes threat of peripheral paresthesia; aids in maintaining acid/base balance

______d. Necessary for red blood cell synthesis; aids in wound healing

______e. Required for cellular activity; required for tissue synthesis; necessary for glucose to enter cells

1. Potassium
2. Vitamin K
3. Trace elements--zinc, manganese, copper, and chromium
4. Calcium
5. Phosphate

TEST

_____ f. Helps control water distribution; required to maintain fluid balance

_____ g. Aids in absorption and utilization of carbohydrates and proteins; aids in regulation of body temperature and neuromuscular contraction

_____ h. Aids in wound healing; essential in maintenance of intracellular cement

_____ i. Essential for bone metabolism; aids in maintaining serum calcium levels

_____ j. Necessary for DNA formation; promotes growth and development

_____ k. Helps regulate acid/base balance; required to maintain osmotic pressure

_____ l. Aids in final absorption of carbohydrates and proteins; stimulates appetite and biliary action

_____ m. Helps prevent metabolic acidosis; given in combination with potassium or sodium

6. Magnesium
7. Acetate
8. Folic acid
9. Vitamin D
10. Vitamin B complex
11. Sodium
12. Vitamin C
13. Chloride

8. List conditions that make patients candidates for parenteral hyperalimentation.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

j. ____________________

k. ____________________

l. ____________________

TEST

9. Distinguish between facts associated with peripheral and central venous hyperalimentation. Write a "P" before peripheral and a "CV" before central venous hyperalimentation facts. Some blanks may contain more than one answer.

_____ a. Addition of all additives is possible

_____ b. Used when severe nutritional depletion is present

_____ c. Used for indefinite periods of time

_____ d. Is a hypertonic solution

_____ e. Used to spare body protein

_____ f. Can provide 50 to 100 grams protein daily

_____ g. Used to provide all nutrients for function and maintenance of all body systems

_____ h. Is a solution of 2.5 to 5.5 percent amino acids and 5 to 10 percent dextrose

_____ i. Can provide moderate to large amounts of calories

_____ j. Can provide 6 to 19 grams nitrogen or 50 to 120 grams protein per day

_____ k. Used if nutritional deficit will extend beyond one week

_____ l. Is infused through peripheral IV site

_____ m. Used for short periods of time

_____ n. Is a solution of 2.5 to 10 percent amino acids and 25 to 50 percent dextrose

_____ o. Can provide small to moderate amounts of calories

_____ p. Used if there is only slight negative nitrogen balance

_____ q. Is a very hypertonic solution

_____ r. Is infused only through central venous catheter

_____ s. Cannot meet total nutritional requirements

_____ t. Used if patient was well nourished before present nutritional deficit

TEST

10. Discuss beginning therapy with central venous hyperalimentation.

____

____

____

11. Distinguish between signs and symptoms of phlebitis and infiltration. Write the correct number in the blanks. Answers may be used more than once.

______ a. Indicated by swelling at and around site, pain and/or burning, and coolness at site

______ b. Increases chance of infection

______ c. Promotes sclerosis of vein if infusion is continued

______ d. Can cause tissue damage due to highly irritating solution

______ e. Develops quickly

______ f. Indicated by redness at insertion site and/or along length of vein, pain, and warmth over insertion area

______ g. Can ruin vein for any further IV therapy

______ h. Can prevent use of that extremity for further IV therapy for long period of time

1. Phlebitis
2. Infiltration

12. Match complications of central venous hyperalimentation to their correct descriptions. Write the correct numbers in the blanks.

Metabolic

______ a. Occurs due to rapid decrease of glucose intake; results in high levels of insulin in blood; caused by slowing or stopping of flow rate for a length of time, or by abrupt termination of therapy; indicated by weakness, trembling, diaphoresis, hunger, apprehension, decreasing level of consciousness, convulsions

______ b. Occurs due to lowered ion levels in blood; caused by inadequate intake of ions; includes vague and nonspecific signs

______ c. Caused by too rapid infusion of solution for body to metabolize, thus causing high concentration of glucose in blood; results in decreased serum insulin, glycosuria, and dehydration; indicated by headache, confusion, lethargy

1. Hyperglycemia
2. Hypoglycemia
3. Electrolyte imbalance

TEST

Local

______a. Occurs at insertion site; caused by contaminated dressing; indicated by redness and/or swelling, warmth at insertion site, purulent drainage at insertion site

______b. Occurs under dressing; caused by type of tape used or skin preparation solution used; indicated by redness and/or hives on skin under dressing, itching under dressing, tearing of skin when tape is removed

______c. Occurs at and surrounding insertion site; caused by penetration of vein wall by catheter; indicated by swelling at insertion site, pain in shoulder and arm on insertion side

1. Infection
2. Infiltration
3. Skin irritation or breakdown

Thrombogenic

______a. Occurs in vessel containing tip of catheter; caused by inadequate flow of solution through catheter by kinking of tubing or catheter, incompatibility of medications or of medication and solution, low flow rate; results in formation of clot inside and/or at tip of distal catheter; indicated by inability to establish adequate flow rate

______b. Occurs in insertion vein and/or vena cava; caused by low flow rate, infection, incorrect type of catheter, repeated punctures; results in injury to wall of vein and formation of clot along vein wall; indicated by swelling of arm and/or neck on insertion side, increase of venous tributaries along chest wall on insertion side, soreness and/or pain in neck, shoulder, and chest on insertion side

1. Thrombophlebitis
2. Thromboembolus

TEST

Systemic

______a. Occurs when large amounts of fluid are infused rapidly, resulting in increased circulating volume; results in increased blood flow through major organs, including kidneys, with resultant increased urine output; may result in tissue dehydration and resultant general dehydration; results in increased loss of intracellular ions; indicated by overload as first sign, greatly increased urine output, hyperglycemia; if allowed to continue, indicated by dehydration and/or hypovolemia

______b. Caused by large amounts of fluid infused in short length of time with resultant dilation and decreased contractility of ventricles; can result in pulmonary edema; indicated by increased respirations without apparent cause, increased heart rate, dry hacky cough

______c. Caused by introduction of microorganisms through IV system; results in formation of toxins that damage small blood vessels; indicated by fever, flushed warm and dry skin, rapid heart rate with bounding pulse, increased respirations, widening pulse pressure

1. Sepsis
2. Fluid overload
3. Osmotic diuresis

13. Select from the following list nursing interventions with regard to central venous hyperalimentation. Write an "X" in the blank before each correct answer.

______a. Monitor IV line for kinks and/or disconnections

______b. Monitor serum glucose levels and report abnormal values

______c. Change dressing only when and as often as physician orders

______d. Explain purpose of solution when doctor orders such

______e. Follow strict aseptic technique during tubing and/or dressing change

______f. Monitor for complications during dressing change only

______g. Maintain closed IV line and system

______h. Use a timing strip

______i. Maintain I & O if ordered by physician

______j. Explain purpose of all solutions to patient and family

______k. Maintain constant flow rate whenever possible

______l. Obtain diabetic urine sugars when ordered by physician

TEST

______ m. Document carefully, on the appropriate chart forms, all of your observations, assessments, and actions

______ n. Change dressing every forty-eight to seventy-two hours

______ o. Weigh patient daily

______ p. Monitor flow rate at least every two to three hours

______ q. Use careful handwashing technique whenever working with solution, tubing, or dressing

______ r. Piggyback medications into line to save patient another "stick"

______ s. Administer medication through line *only* if absolutely necessary

______ t. Increase infusion rate as required to assure that patient receives adequate nutrients

______ u. Tape all connections securely in line

______ v. Change dressing if possibility of contamination exists

______ w. Inspect solution and container carefully before infusing

______ x. Notify physician whenever urine sugar is positive

______ y. Monitor prescribed flow rate carefully

______ z. Do not increase infusion rate by more than 10 percent at any time

______ aa. Monitor vital signs as ordered by physician

______ bb. Obtain diabetic urine sugars at least every six hours

______ cc. Avoid any needle punctures of IV line

______ dd. Monitor for signs of fluid overload

______ ee. Monitor for signs of metabolic complications

______ ff. Change tubing and dressing every forty-eight hours

______ gg. Monitor insertion site and surrounding tissues for local and thrombogenic complications

______ hh. Notify physician of urine sugar of 2+ or over

______ ii. Change all IV tubing at one time every twenty-four hours

______ jj. Maintain accurate I & O; monitor continuing totals for excess or deficit

______ kk. Refrigerate solution if not to be used within two hours

TEST

_____ll. Monitor vital signs, including temperature, every four hours during first two to three weeks of therapy, and then every eight hours

_____mm. Refrigerate solution until ready for administration

_____nn. Compare prescribed solution, using appropriate communication tool, to the solution label

14. Discuss lipids as related to parenteral nutrition.

15. List the two types of lipids available for parenteral nutrition.

a. ____________________

b. ____________________

16. Discuss considerations for administration of lipids.

TEST

17. List nursing interventions with regard to lipids.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

h. ______________________________

i. ______________________________

(NOTE: Test questions 18 and 19 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

18. Implement correct nursing actions with central venous hyperalimentation.

19. Demonstrate the ability to administer a medication through central venous line.

PARENTERAL NUTRITION
UNIT XIV

ANSWERS TO TEST

1. a. 9
   b. 3
   c. 13
   d. 1
   e. 5
   f. 2
   g. 10
   h. 6
   i. 14
   j. 15
   k. 11
   l. 4
   m. 8
   n. 16
   o. 12
   p. 7
   q. 19
   r. 17
   s. 22
   t. 20
   u. 18
   v. 21

2. a, c, f, i

3. a. 2
   b. 3
   c. 2
   d. 1
   e. 3
   f. 2
   g. 3
   h. 1
   i. 3
   j. 2
   k. 1
   l. 2
   m. 3
   n. 2
   o. 3

4. Discussion should include the following
   a. Carbohydrates
      1) Causes conversion of ingested protein for use as energy
      2) Causes less efficient functioning of organs such as the brain
   b. Proteins
      1) Adversely affects all body systems
      2) Increases chance of pathophysiological complications

ANSWERS TO TEST

c. Fats
    1) Contributes to deficiencies of fat-soluble vitamins A, D, E, and K
    2) Decreases functioning of body cells

5. b, e, g, i, j

6. Discussion should include the following
    a. Provides essential nutrients by IV route
        1) Carbohydrates in the form of dextrose
        2) Proteins in the form of amino acids
        3) Fats in the form of lipid emulsions
        4) Electrolytes, vitamins, and trace elements
    b. Provides only partial nutrient support by peripheral infusion
    c. Provides complete nutrient support by central venous infusion

7.

a.	4	h.	12
b.	2	i.	9
c.	5	j.	8
d.	3	k.	13
e.	1	l.	10
f.	11	m.	7
g.	6		

8. a. Burns
    b. Surgery
    c. Congenital anomalies in the newborn
    d. Bowel diseases such as Crohn's disease, ulcerative colitis, and radiation colitis
    e. Central nervous system dysfunctions
    f. Acute pancreatitis
    g. Short bowel syndrome

ANSWERS TO TEST

h. Anorexia nervosa

i. Bowel fistulas

j. Acute renal failure

k. Chemotherapy with resultant loss of appetite, nausea, or diarrhea

l. Cancer

9. a. P, CV
   b. CV
   c. CV
   d. P
   e. P
   f. P
   g. CV
   h. P
   i. CV
   j. CV
   k. CV
   l. P
   m. P
   n. CV
   o. P
   p. P
   q. CV
   r. CV
   s. P
   t. P

10. Discussion should include the following

    a. Therapy is usually begun with a 25 percent dextrose solution

    b. Dextrose concentration is increased to 50 percent as patient tolerance allows

    c. Therapy is begun with flow rates of 50 to 85 milliliters per hour, and increased as patient tolerance allows

11. a. 2
    b. 2
    c. 1
    d. 2
    e. 1
    f. 1
    g. 1
    h. 2

12. **Metabolic**

    a. 2

    b. 3

    c. 1

ANSWERS TO TEST

Local

a. 1

b. 3

c. 2

Thrombogenic

a 2

b. 1

Systemic

a. 3

b. 2

c. 1

13. a, b, e, g, h, j, m, n, o, q, s, u, v, w, y, z, bb, cc, dd, ee, gg, hh, ii, jj, ll, mm, nn

14. Discusssion should include the following

    a. Composed of soybean or safflower oil emulsions and purified egg phosphatides or phospholipids in glycerin in water

    b. Used to prevent or correct deficiencies of essential fatty acids when oral intake is inadequate or impossible

    c. Provide large amount of concentrated calories

    d. Appear milky white in color

    e. Are isotonic

    f. Infused frequently with peripheral hyperalimentation to reduce irritation of vein due to hypertonic character of solution

15. a. Intralipid

    b. Liposyn

ANSWERS TO TEST

16. Discussion should include the following

    a. May be given by either peripheral or central venous routes

    b. Should be piggybacked into administration line as close to insertion site as possible

    c. Must not be filtered

    d. Must be hung higher than main solution

    e. Are compatible with hyperalimentation solutions

    f. Are not compatible with any medications

    g. Can cause fat overload and untoward reactions

17. a. Explain the product and its use to patient and family

    b. Maintain constant flow rate

    c. Monitor patient's condition and vital signs closely during first infusion

    d. Use strict aseptic technique whenever working with lipids

    e. Inspect solution carefully to make sure that it has not separated

    f. If fever and chills occur, stop infusion and notify physician

    g. If solution is given to patient who is allergic to eggs, monitor for signs of anaphylaxis

    h. Notify laboratory if lipids are infused within two hours prior to blood being drawn

    i. Document carefully, on appropirate chart forms, all of your observations, assessments, and actions

18. Evaluated to the satisfaction of the instructor

19. Performance skills evaluated to the satisfaction of the instructor

PEDIATRIC IV THERAPY
UNIT XV

UNIT OBJECTIVE

After completing this unit, the student should be able to perform adequate and safe venipuncture, and administer fluids to the pediatric patient with emphasis on the psychological and emotional support of the child. This knowledge will be shown by completing assignment sheets, job sheets, and unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match to their correct definitions terms associated with pediatric IV therapy.
2. Discuss psychological considerations for IV therapy for the pediatric patient.
3. Distinguish among ages associated with specific psychological and emotional developmental levels.
4. State suggested nursing interventions with regard to reducing psychological and emotional stress for children of various ages.
5. Select from a list additional nursing considerations for psychological and emotional support of the pediatric patient.
6. State nursing interventions that provide emotional support after needle/catheter insertion.
7. Select from a list infusion sites in the infant and child.
8. State considerations for selection of insertion site.
9. Describe physical preparation of child and site for venipuncture.
10. Discuss selection of equipment for the pediatric patient.
11. Select from a list information to know about types of solutions and flow rates for the pediatric patient.
12. Discuss venipuncture considerations for the pediatric patient.
13. State suggestions for use of splints and restraints.
14. Select from a list nursing interventions with regard to proper monitoring and maintenance of pediatric IV therapy.
15. State methods of enlisting aid and cooperation of parent and child.
16. State nursing interventions with regard to meeting special needs of the pediatric patient.

OBJECTIVE SHEET

17. Meet emotional needs of pediatric patients.
18. Practice psychological and emotional support for the pediatric patient.
19. Demonstrate the ability to
    a. Apply a mummy restraint.
    b. Use a rubber band for a scalp tourniquet.
    c. Detect infiltration.

PEDIATRIC IV THERAPY
UNIT XV

SUGGESTED ACTIVITIES

I. Suggested activities

   A. Obtain equipment to supplement unit.

      1. Doll or teaching model

      2. Blanket of sufficient size to wrap doll

      3. Wide rubber bands--at least one for each student

      4. Narrow rubber bands--at least one for each student

   B. Prepare equipment for ease of use.

   C. Make up situations for role playing for Assignment Sheet #2.

   EXAMPLES: Two-year-old is in hospital with severe diarrhea. IV is to be given to correct dehydration and electrolyte imbalance. Mother is with child and is very anxious and feels she allowed child to get "bad" before seeking help.

   Ten-year-old is in hospital for appendectomy. Child appears and acts younger than ten. Parents are with child and are very protective. They do most of the talking for the child.

   D. Make transparency.

   E. Give pretest.

   F. Provide students with objective sheet.

   G. Discuss unit and specific objectives.

   H. Provide students with information sheet.

   I. Discuss information sheet.

   J. Individualize instruction for students with special needs.

   K. To supplement your discussion of Information Sheet, Sections II-VI, invite a child psychologist to speak on psychological and emotional support for the pediatric patient.

   L. Have students complete Assignment Sheets #1 and #2.

   M. Refer students to "Venipuncture Process Unit VIII, for review.

SUGGESTED ACTIVITIES

N. Invite pediatric nurse specialist to speak on pediatric IV therapy.

O. Provide students with job sheets.

P. Demonstrate and discuss procedures outlined in job sheets.

Q. Have students perform tasks outlined in job sheets.

R. Give test.

S. Discuss test.

T. Reteach if necessary.

II. Instructional materials

A. Objective sheet

B. Suggested activities

C. Information sheet

D. Transparency master: TM #1--Veins in the Infant and Child

E. Assignment sheets

1. Assignment Sheet #1--Meet Emotional Needs of Pediatric Patients

2. Assignment Sheet #2--Practice Psychological and Emotional Support for the Pediatric Patient

F. Answers to assignment sheets

G. Job sheets

1. Job Sheet #1--Apply a Mummy Restraint

2. Job Sheet #2--Use a Rubber Band for a Scalp Tourniquet

3. Job Sheet #3--Detect Infiltration

H. Test

I. Answers to test

III. Unit references

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E. Sager, Diane Proctor, and Suzanne Kovarovic Bomar. *Intravenous Medications: A Guide to Preparation, Administration, and Nursing Management.* Philadelphia: J. B. Lippincott, 1980.

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PEDIATRIC IV THERAPY
UNIT XV

INFORMATION SHEET

I. Terms and definitions

   A. Antecubital fossa--Triangular area anterior to and below the elbow

   B. Accessibility--Ease or difficulty of use

   C. Barrier--Obstruction; limitation

   D. Concept--Idea; general notion

   E. Developmental--Pertaining to growth to full size or maturity

   F. Document--Anything written to record or prove something

   G. Dorsal--Of, on, or near the back

   H. Flexor--A part that bends

   I. Immobilize--To prevent movement

   J. Interaction--Actions on or with each other

   K. Nomogram--Representation by graphs, diagrams, or charts of the relationship between numerical variables

   L. Reinforcement--Reward for the appropriate response in a learning situation

   M. Stimulus--Change of environment of sufficient intensity to evoke a response

   N. Translucent--Partially transparent; letting light pass but diffusing it so that objects on other side cannot be distinguished

   O. Trauma--Physical injury caused by external force or violence

II. Psychological considerations for IV therapy for the pediatric patient

   A. Hospitalized child faces many adjustments and new experiences

      EXAMPLES:
      1. Separation from family
      2. Interaction with new people
      3. New experiences of many kinds

INFORMATION SHEET

B. Illness can create many real, imaginary, and potential threats

EXAMPLES:
1. Fear of bodily injury such as pain, mutilation, and death
2. Uncertainty about expected behavior and limits of behavior
3. Loss of control of their environment and/or themselves

C. Emotional support given before and during IV therapy not only influences present and future development, but also present and future health care

D. Nursing actions must help minimize stress, aid the child in coping with anxieties and fears, and promote cooperation

E. Type of support needed will vary with each individual

(NOTE: The type of support given will depend upon many factors. The nursing history obtained from the child and/or family must include information relating to these factors.)

EXAMPLES:
1. Age
2. Developmental level
3. Previous experiences with injections
4. Knowledge level of intravenous therapy
5. Child's confidence in himself or herself
6. Support received from others
7. Communications skills

III. Ages associated with specific psychological and emotional developmental levels

A. Newborn (birth to three months)

1. Built-in stimulus barrier delays reaction and possibly reduces pain

2. Fear and/or anxiety are minimized due to lack of experience and undeveloped intellect

3. Restricted movement, prolonged discomfort, and deep pain cause distress

B. Infant (three to twelve months)

1. Can anticipate pain

2. Demonstrates anticipation of pain by crying, wiggling, and struggling

C. Toddler and preschool (one to five years)

1. Previous experiences influence concept of procedure

2. Fantasies influence concept of procedure

3. Communication skills are limited

4. Demonstrates anticipation of pain by crying, striking out, and moving away

INFORMATION SHEET

D. School age (six to twelve years)

1. Can understand procedure and technique due to greater intellect
2. Anticipates pain
3. Desires to show control over his or her actions, but often requires help to achieve control
4. Communication skills are well developed

E. Adolescent (thirteen years to adult)

1. Desires complete explanation of procedure

   (NOTE: Explanation of procedure should be similar to that given to adults.)

2. Is concerned for own body image
3. Considers helplessness a great threat

IV. Suggested nursing interventions with regard to reducing psychological and emotional stress for children of various ages (Assignment Sheets #1 and #2)

A. Newborn (birth to three months)

1. Provide comfort by gentle handling and stroking
2. Talk to child in calm, soothing, quiet voice

B. Infant (three to twelve months)

1. Do not allow anyone other than nurse to provide restraint
2. Allow parent or nurse to provide comfort to infant by stroking
3. Talk to child in calm, soothing, quiet voice

C. Toddler and preschool (one to five years)

1. Provide support by allowing child to examine and play with nonsterile equipment

   EXAMPLES: Empty IV bag, IV tubing

   (NOTE: Allow the child to see how this equipment is used on a doll.)

   (CAUTION: Do not allow child to play with needles.)

2. Explain to child that it is all right to cry but that he or she must hold very still during procedure

INFORMATION SHEET

3. Explain to child that someone will be with him or her during procedure

   (NOTE: This can reassure children that someone will help them control themselves.)

4. Make time between explanation and procedure relatively brief

D. School age (six to twelve years)

1. Explain procedure

   (NOTE: Cooperation is probable with this age group if they know what is expected.)

2. Explain to child that he or she must hold very still during procedure

3. Allow time for verbal expression of fears and concerns

4. Provide support by allowing child to examine and play with nonsterile equipment

   EXAMPLES: Empty IV bag, IV tubing

   (CAUTION: Do not allow child to play with needles.)

5. Provide support by using simple drawings and pictures, and by reading material

6. Time between explanation and procedure should not be unnecessarily long but should be long enough to allow child to work through feelings

E. Adolescent (thirteen years to adult)

1. Explain purpose and procedure

2. Reassure adolescent that body will not be damaged or changed

3. Reassure adolescent that sense of independence will be respected

4. Allow time between explanation and procedure for consideration of explanation

5. Encourage adolescent to ask questions

V. Additional nursing considerations for psychological and emotional support of the pediatric patient

A. Include parent or significant other person in explanation

   (NOTE: This person can then help reinforce the explanation and offer support to the child.)

INFORMATION SHEET

B. Use language that child and parent can understand

C. Allow older child some choice

EXAMPLE: Which arm to use

(NOTE: Active participation allows the child some control of the situation.)

D. Listen to child

E. Acknowledge and accept child's fears and anxieties

(NOTE: Let the child know that it is all right to be afraid and even to cry.)

F. Explain how you expect child to behave during procedure and how you will help

G. Have child demonstrate how he or she will behave

H. Perform procedure in an area away from child's hospital room if possible

(NOTE: This will remove the unpleasant procedure from child's room and allow the child to continue to associate the room with comfort and security.)

I. Prepare all equipment before bringing child into room

J. Explain to child the approximate amount of pain to expect, and explain that the needle will be felt, but that the pain will quickly "go away"

K. Provide privacy during procedure

(NOTE: Privacy is necessary to preserve self-esteem if the child cries or requires restraint.)

L. Ask another staff member to assist with procedure

M. Determine whether parent should be present during procedure

(NOTE: The young child may want the parent in the room, but the older child may not for fear that he or she may not act like the parent wants. If the nurse determines that the parent is too anxious and may communicate fears to the child, it may be better if the parent is not present.)

N. If parent is present during procedure, encourage parent to comfort child, but do not allow parent to assist with procedure

(NOTE: Any restraining must be done by nursing personnel only.)

INFORMATION SHEET

VI. Nursing interventions that provide emotional support after needle/catheter insertion

A. Use positive reinforcement

(NOTE: Even if the child has been difficult, find something positive and compliment the child for it.)

EXAMPLE: "I know you tried very hard to hold still."

B. Allow time for child to adjust to the way IV feels

C. Listen to and answer any questions

(NOTE: Rather than ask questions, children will often show through their play how they feel about what is happening to them.)

D. Provide adequate stimulation and activity for duration of therapy

E. Provide contact and interaction with other people

F. Encourage parents to maintain normal contact with child

(NOTE: Show the parent how to safely handle the child.)

G. Encourage play

(NOTE: If at all possible, the child should be allowed out of bed to participate in play.)

VII. Infusion sites in the infant and child (Transparency #1)

A. Scalp veins

(NOTE: Scalp veins do not have valves and an IV can be infused in either direction.)

B. Dorsal hand veins

C. Dorsal foot veins

D. Flexor surface of wrist

E. Antecubital fossa

VIII. Considerations for selection of insertion site

A. Use of scalp veins is more frequent for newborns and infants to one year old

B. Veins in hand and lower arms are readily accessible and allow mobility

(NOTE: Consider a site that will require the least restraint. The initial insertion should be on the nondominant side; if the child sucks the thumb, the insertion site should be on the opposite side.)

INFORMATION SHEET

C. Avoid use of antecubital fossa unless child can cooperate

(NOTE: Consider a site that is least vulnerable to infiltration.)

D. With prolonged therapy, use most distal site on an extremity and then proceed up extremity

(NOTE: This will depend upon accessibility and convenience. Rotate arms with each venipuncture.)

E. Veins in feet and legs should be used only when all other sites are inaccessible

IX. Physical preparation of child and site for venipuncture

A. Before attempting venipuncture, immobilize extremity if necessary by taping it to a padded splint or covered sandbag

(CAUTION: Take care to avoid restricting circulation when taping a splint in place.)

B. Immobilize infant before attempting venipuncture (Job Sheet #1)

(NOTE: If using a scalp vein, have another nurse hold infant's head still.)

C. Have another nurse assist child in remaining still

D. Use same prep agents as those used for an adult

EXAMPLES: Povidone iodine, alcohol

(NOTE: Use precaution in regard to allergies with these preparations.)

E. Use the same technique to prepare site as that used for an adult

(NOTE: You might allow an older child to help you do the skin preparation.)

X. Selection of equipment for the pediatric patient

A. Needle and/or catheter

1. Use wing-tipped needle for therapy of short duration, for infants and small children, and for veins of small size

(NOTE: The gauge size can vary from 23 to 27.)

2. Use inside-the-needle catheter for therapy of longer duration, and for child of any age but usually older than one year

(NOTE: The gauge size can vary from 20 to 24. Plastic catheters are more stable and infiltrate less readily.)

INFORMATION SHEET

B. Tubing

   1. Use microdrip delivery system

      (NOTE: Exceptions would be the administration of blood and the use of special tubings required for some infusion pumps.)

   2. Use volume control device if at all possible

      (NOTE: The limited volume in the chamber helps prevent accidental fluid overload.)

C. Accessory equipment

   1. May use extension tubings to permit greater freedom of movement

   2. May use filters as with an adult

   3. May use infusion pumps for maintenance of precise flow rates

      (CAUTION: The use of an infusion pump does not relieve the nurse of any responsibility of closely monitoring the IV.)

XI. Information to know about types of solutions and flow rates for the pediatric patient

A. Solution type will be ordered by physician

   (CAUTION: Extreme care must be taken to correctly identify the type of solution ordered. The infusion of an incorrect solution could endanger a child's life.)

B. Types of solution frequently ordered for pediatric patients are 1/4% to 1/2% saline in 5% to 10% dextrose, 1/2 Ringers Lactate to Ringers Lactate, and balanced electrolyte solutions in dextrose

C. Flow rates based on body weight, age, and surface area will be ordered by physician

   (NOTE: Surface area is based on weight and length using a nomogram.)

   (CAUTION: The prescribed flow rate must be carefully maintained. A child is very sensitive to slight changes in fluid balance.)

D. Electrolyte replacement will be ordered frequently

   EXAMPLES: Potassium, sodium, chloride

XII. Venipuncture considerations for the pediatric patient

A. Procedures similar to adult therapy

   1. Insertion technique is essentially same as that used for adult

INFORMATION SHEET

2. Taping techniques are essentially same as those used for adult

   (NOTE: Clear, nonallergenic tape is easy to remove and will stretch to help eliminate possible tissue damage if infiltration occurs.)

3. Labeling of site, tubing, and container is same as that used for adult

B. Procedures specific to the pediatric patient

1. An assistant's hand grasped firmly around child's extremity can be an effective tourniquet

   (NOTE: Often a child will object to the tourniquet as much as the venipuncture.)

2. Use of a wide rubber band makes an adequate scalp tourniquet (Job Sheet #2)

3. Controlled breathing technique can help calm child and will help keep veins distended

   EXAMPLE: Have child inhale slowly through nose and exhale through mouth with pursed lips.

4. Splints must be well padded and covered with soft, absorbent cloth

   (CAUTION: Take great care not to restrict circulation when taping a splint in place.)

5. Double-faced tape should be used to secure splints

   (NOTE: This type of tape helps prevent damage to skin when tape is removed.)

6. Restraints should be used only if there is a danger that the child will hurt him- or herself

   (NOTE: Children often do more damage trying to resist a restraint than they do if one is not used.)

   (CAUTION: Any type of restraint must be applied in a manner that permits easy, rapid removal.)

7. Paper cup can be placed over a wing-tipped needle inserted into a scalp vein

   (NOTE: The bottom of the cup is cut out so that site may be observed.)

   (CAUTION: A hard cup [plastic] should not be used. Any cup device must be used with care to prevent impairment of blood flow by pressing on vein.)

8. Decorate tape with stickers or pictures

INFORMATION SHEET

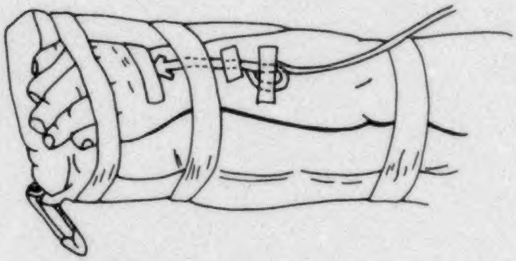
XIII. Suggestions for use of splints and restraints

A. Immobilization of infant's head can be accomplished with sandbags

B. Immobilization of an extremity can be accomplished with sandbags, armboards of small size, elbow splints, and mittens (Figures 1-3)

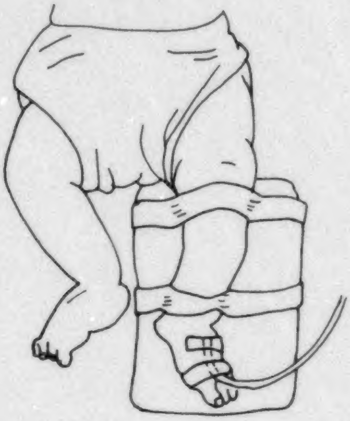
EXAMPLES:

FIGURE 1



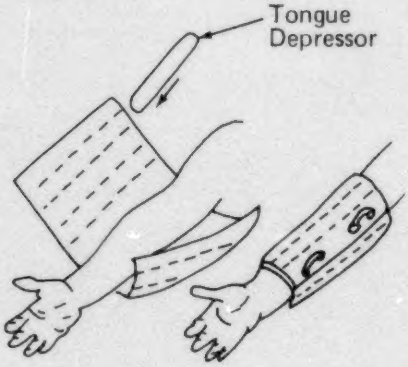
Upper Extremity

FICURE 2



Lower Extremity

FIGURE 3



Elbow Restraint

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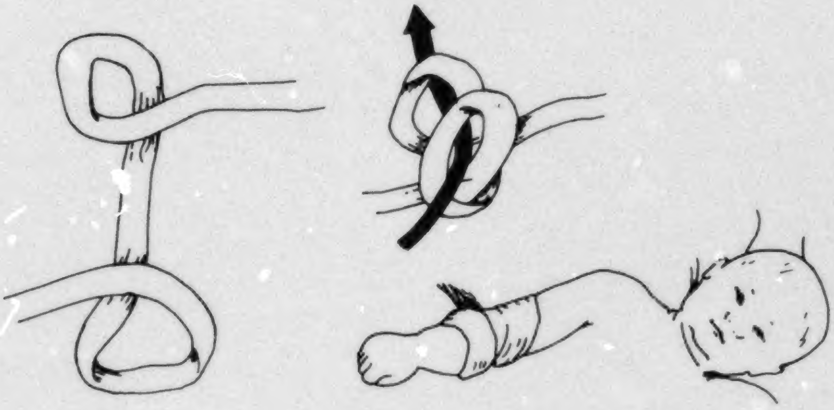
INFORMATION SHEET

C. Pinning armboard to bed covers provides a simple restraint

D. Clove hitch restraint can be used for older child (Figure 4)

EXAMPLE:

FIGURE 4



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E. Restraints must be removed at intervals, and range of motion allowed

(NOTE: The restraint should be removed hourly if at all possible.)

(CAUTION: If child is too ill to move, range of motion exercises must be done by the parent or nurse.)

XIV. Nursing interventions with regard to proper monitoring and maintenance of pediatric IV therapy (Job Sheet #3)

A. Use small volume solution containers (250 ml to 500 ml) whenever possible

(NOTE: This precaution would not be as necessary with an older child [ten years to adult] or larger child [70 pounds or above].)

B. Take great care in monitoring prescribed flow rate

(CAUTION: Small amounts of fluid imbalance can cause severe effects in children because a high percent of their body weight is water.)

C. Regulate flow rate when infant or child is still and calm

(NOTE: Crying can constrict the blood vessels and cause a rapid flow when crying stops.)

INFORMATION SHEET

D. Check flow rate every thiry minutes to one hour for older infant and child

E. Check flow rate every fifteen to thirty minutes for newborn

(NOTE: The use of an infusion pump greatly aids flow rate regulation, but does not relieve the nurse of the responsibility of checking the flow rate frequently. Machines can malfunction.)

F. Check insertion site frequently for signs of complications; change insertion site when complications are detected (Job Sheet #3)

EXAMPLES: Infiltration, phlebitis

(CAUTION: Infiltration can be difficult to detect in the young child [three to five years] due to an increased amount of subcutaneous fat.)

G. Change insertion site at least every seventy-two hours

(NOTE: The only exceptions are an IV that is to be discontinued within twelve hours, a severely critical condition, or previous great difficulty with venipuncture on the child.)

H. Assess circulation and sensation of extremity frequently

(NOTE: Assess circulation and extremity sensation at least twice per shift.)

I. Protect insertion site from trauma

J. Change tubing and solution container every twenty-four hours, observing same precautions as those observed with adult

(NOTE: Obtain and know your hospital's policy and procedures for tubing and solution change.)

K. Remove dressing, cleanse and inspect insertion site, and redress every twenty-four hours, using same techniques as those used for adults

L. Monitor intake and output carefully

(NOTE: Diapers can be weighed before and after use to estimate urine output.)

M. Reinforce need for therapy at every opportunity

N. Carefully document all observations, assessments, and actions on appropriate chart form

XV. Methods of enlisting aid and cooperation of parent and child

(NOTE: The actions listed below give the parent and child a feeling of being useful and of retaining some control over the situation.)

A. Teach signs of infiltration and phlebitis

INFORMATION SHEET

B. Teach reason for and skills needed to monitor flow rate

C. Teach how to avoid possible injury to site

D. Teach how to avoid tension on needle/catheter or tubing

E. Teach how to resume whatever degree of mobility is allowed

(NOTE: Monitor activity until you are sure that child and/or parent can conduct exercise safely.)

F. Instruct parent and/or child how to call for help

XVI. Nursing interventions with regard to meeting special needs of the pediatric patient

A. Body weight should be measured at the same time each day on the same scales

B. Oral hygiene must be meticulous

C. Infant's need for sucking must be met

(NOTE: A commercial pacifier can be used or one can be made by stuffing a nipple with gauze or cotton.)

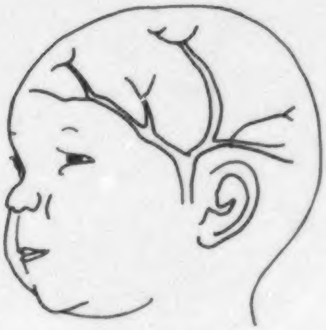
D. Activities should be planned to maintain level of independence and development, and to provide sensory stimulation

EXAMPLES: Exercise, ambulation, holding and cuddling, stories, colorful objects, allowing children to feed themselves and select their menus when possible

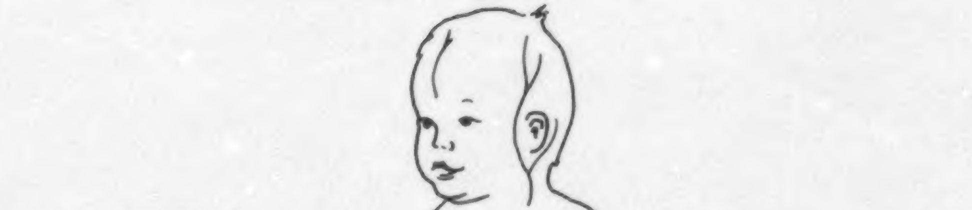
E. Positive reinforcement for cooperation or attempts at cooperation should be given continually

F. Help and encouragement should be given often to both child and parent

Veins in the Infant and Child



Scalp Veins



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PEDIATRIC IV THERAPY
UNIT XV

ASSIGNMENT SHEET #1--MEET EMOTIONAL NEEDS OF PEDIATRIC PATIENTS

NAME ______________________ SCORE ____________

As a nurse you will be caring for the pediatric patient at some time in your career. Your actions and/or reactions are very important to the emotional health of the child. You can also, by your actions, greatly influence the attitude toward future health care of the child.

Read the case studies below, and answer the questions that follow.

CASE STUDY #1

Michael Jones is a two-month-old who has been admitted to the hospital with severe diarrhea resulting in dehydration. An IV is ordered.

A. What emotional support can you provide during the venipuncture?

B. What nursing actions to provide emotional support should you carry out after the venipuncture is accomplished?

CASE STUDY #2

Debra May is a thirteen-year-old who has been admitted to the hospital for an acute asthma attack (her first). An IV aminophylline drip has been ordered.

A. What emotional support can you provide during the venipuncture?

ASSIGNMENT SHEET #1

B. What nursing actions to provide emotional support could you carry out after the venipuncture is accomplished?

PEDIATRIC IV THERAPY
UNIT XV

ASSIGNMENT SHEET #2--PRACTICE PSYCHOLOGICAL AND EMOTIONAL SUPPORT FOR THE PEDIATRIC PATIENT

NAME ______________________________ SCORE ______________

This exercise can help you more fully understand the emotional impact of IV therapy on the child and family. This exercise allows you to practice your communication skills before being faced with an actual situation. Your instructor will designate specific situations for you to use.

A. Divide into groups of four or five

B. Choose people to play the following roles

   1. The patient (infant, child, or adolescent)

   2. The parent or parents

   3. The nurse

   4. An observer, if groups are composed of five members

C. Role play the situation assigned by the instructor; practice giving psychological and emotional support to the pediatric patient

D. Exchange roles as time allows

PEDIATRIC IV THERAPY
UNIT XV

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

CASE STUDY #1

A. Hold infant during the venipuncture; gently stroke the arms, legs, or chest; talk to child in a calm, soothing quiet voice

B. Provide stimulation and activity during duration of therapy; hold child at intervals; encourage visits by family members; encourage family members to hold and cuddle child

CASE STUDY #2

A. Explain procedure and purpose for procedure; give reassurance that her body will not be damaged or changed; reassure her that her independence will be respected; allow enough time after the explanation for her to consider your explanation; encourage her to ask questions

B. Use positive reinforcement; listen to and answer questions; provide adequate activity; provide contact and interaction with other people; encourage visitors, family, and friends

Assignment Sheet #2--Evaluated to the satisfaction of the instructor

PEDIATRIC IV THERAPY
UNIT XV

JOB SHEET #1--APPLY A MUMMY RESTRAINT

I. Equipment--Blanket of sufficient size to completely wrap infant

II. Procedure

   A. Obtain blanket and take to room

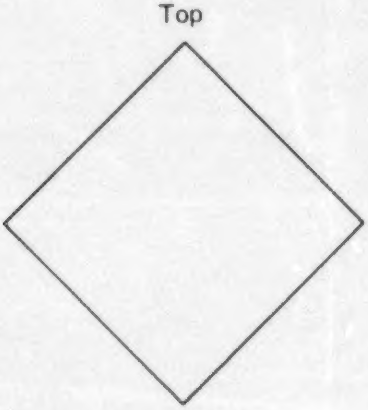
   B. Identify yourself to parent

   C. Explain procedure to parent

   D. Wash hands

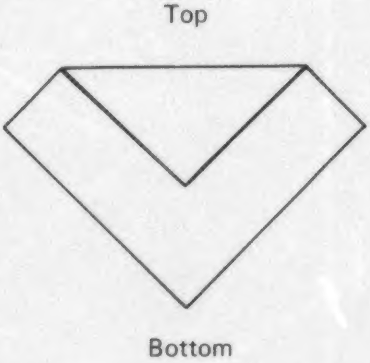
   E. Lay blanket flat with a corner at top and bottom (Figure 5)

FIGURE 5



   F. Fold top one-third of blanket toward bottom (Figure 6)

FIGURE 6

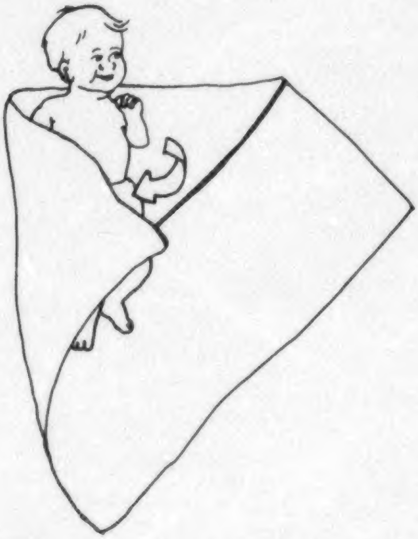


JOB SHEET #1

G. Place infant on blanket so that top edge of blanket is even with infant's chin

H. Fold right side of blanket over infant and tuck under left side (Figure 7)

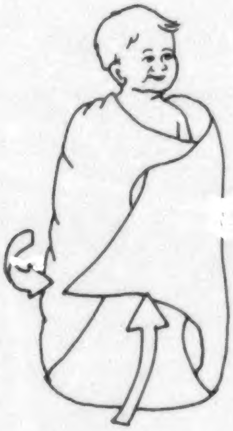
FIGURE 7



I. Fold bottom of blanket up

J. Fold left side of blanket over child and tuck under right side (Figure 8)

FIGURE 8



K. Wash hands before leaving room.

PEDIATRIC IV THERAPY
UNIT XV

JOB SHEET #2--USE A RUBBER BAND FOR A SCALP TOURNIQUET

I. Equipment

   A. Doll or teaching model

   B. Wide rubber band

   C. Small narrow rubber band

   D. Scissors (bandage scissors preferred)

   E. Razor

II. Procedure

   A. Obtain equipment and take to room

   B. Identify yourself to parent

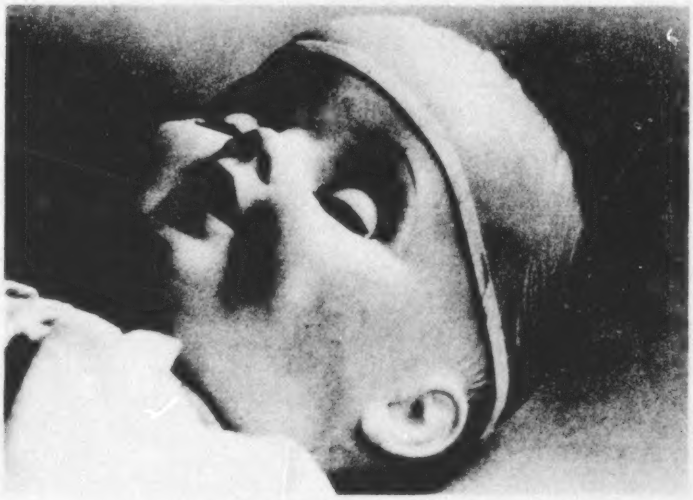
   C. Explain procedure to parent

   D. Wash hands

   E. Shave scalp hair from insertion site and two to three inches around site

   F. Apply wide rubber band around scalp just above eyebrows (Figure 9)

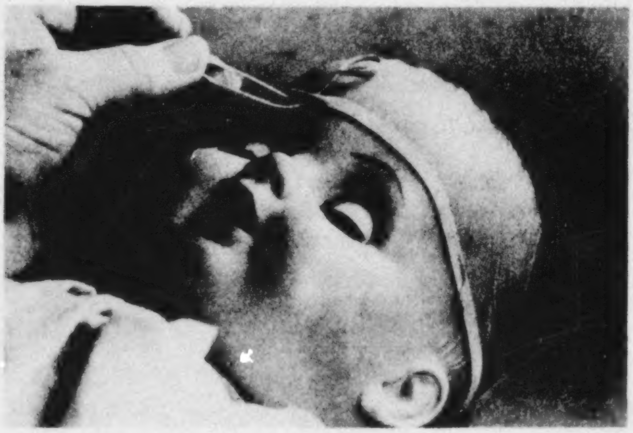
FIGURE 9



JOB SHEET #2

G. Place small, narrow rubber band lengthwise under a section of wide rubber band (Figure 10)

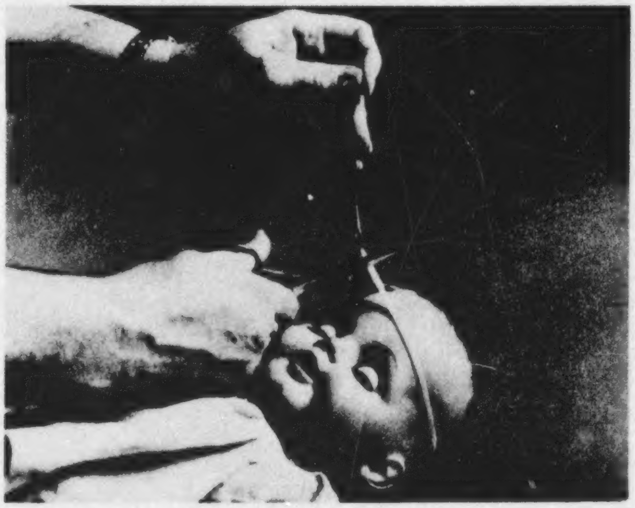
FIGURE 10



H. Perform venipuncture

I. After needle is secured, lift up on narrow rubber band and clip wide rubber band with scissors (Figure 11)

FIGURE 11



J. Wash hands before leaving room

PEDIATRIC IV THERAPY
UNIT XV

JOB SHEET #3--DETECT INFILTRATION

I. Equipment--Penlight

II. Procedure

- A. Obtain penlight and take to room
- B. Identify yourself to patient and family
- C. Explain procedure to patient and family
- D. Wash hands
- E. Turn on penlight
- F. Place penlight lightly on skin beside needle or catheter; observe translucency of skin
- G. Place penlight lightly on skin at same area on other appendage; observe translucency of skin

  (NOTE: Occurrence of infiltration is positive if area of translucency is larger on IV insertion side.)
- H. Wash hands before leaving room

PEDIATRIC IV THERAPY
UNIT XV

TEST

NAME ____ SCORE ________________

1. Match to their correct definitions terms associated with pediatric IV therapy. Write the correct numbers in the blanks.

_____a. A part that bends

_____b. Physical injury caused by external force or violence

_____c. Obstruction; limitation

_____d. Partially transparent; letting light pass but diffusing it so that objects on other side cannot be distinguished

_____e. Pertaining to growth to full size or maturity

_____f. To prevent movement

_____g. Of, on, or near the back

_____h. Change of environment of sufficient intensity to evoke a response

_____i. Ease or difficulty of use

_____j. Actions on or with each other

_____k. Anything written to record or prove something

_____l. Reward for the appropriate response in a learning situation

_____m. Idea; general notion

_____n. Representation by graphs, diagrams, or charts of the relationship between numerical variables

_____o. Triangular area anterior to and below the elbow

1. Translucent
2. Interaction
3. Developmental
4. Stimulus
5. Barrier
6. Concept
7. Reinforcement
8. Flexor
9. Antecubital fossa
10. Accessibility
11. Immobilize
12. Nomogram
13. Document
14. Trauma
15. Dorsal

TEST

2. Discuss psychological considerations for IV therapy for the pediatric patient.

____

____

____

____

____

____

____

3. Distinguish among ages associated with specific psychological and emotional developmental levels. Write the correct numbers in the blanks. Numbers may be used more than once. Developmental levels are continued on the next page.

_____ a. Anticipates pain

_____ b. Previous experiences influence concept of procedure

_____ c. Demonstrates anticipation of pain by crying, wiggling, and struggling

_____ d. Built-in stimulus barrier delays reaction and possibly reduces pain

_____ e. Desires complete explanation of procedure

_____ f. Desires to show control over his or her actions, but often requires help to acheive control

_____ g. Considers helplessness a great threat

_____ h. Communication skills are limited

_____ i. Fantasies influence concept of procedure

_____ j. Communication skills are well developed

_____ k. Fear and/or anxiety are minimized due to lack of experience and undeveloped intellect

_____ l. Can anticipate pain

1. Newborn (birth to three months)
2. Infant (three to twelve months)
3. Toddler and preschool (one to five years)
4. School age (six to twelve years)
5. Adolescent (thirteen years to adult)

TEST

______m. Can understand procedure and technique due to greater intellect

______n. Restricted movement, prolonged discomfort, and deep pain cause distress

______o. Demonstrates anticipation of pain by crying, striking out, and moving away

______p. Is concerned for own body image

4. State suggested nursing interventions with regard to reducing psychological and emotional stress for children of various ages.

a. Newborn (birth to three months)

1) ______________________________

2) ______________________________

b. Infant (three to twelve months)

1) ______________________________

2) ______________________________

3) ______________________________

c. Toddler and preschool (one to five years)

1) ______________________________

2) ______________________________

3) ______________________________

4) ______________________________

d. School age (six to twelve years)

1) ______________________________

2) ______________________________

3) ______________________________

4) ______________________________

5) ______________________________

6) ______________________________

TEST

e. Adolescent (thirteen years to adult)

1) ______________________________

2) ______________________________

3) ______________________________

4) ______________________________

5) ______________________________

5. Select from the following list additional nursing considerations for psychological and emotional support of the pediatric patient. Write an "X" in the blank before each correct answer.

_____a. Offer explanation to parent if there is time

_____b. Have child demonstrate how he or she will behave

_____c. Use language that child and parent can understand

_____d. Instruct parent to hold child still

_____e. Acknowledge and accept child's fears and anxieties

_____f. Allow child to scream and strike out to express frustration and anger

_____g. Include parent or significant other person in explanation

_____h. Allow younger child some choice

_____i. Allow child to talk only after procedure is finished

_____j. Prepare all equipment before bringing child into room

_____k. Perform all venipuncture in treatment room

_____l. Explain how you expect child to behave during procedure and how you will help

_____m. Explain to child the approximate amount of pain to expect, and explain that the needle will be felt, but that the pain will quickly "go away"

_____n. Pay no attention if child screams or hits

_____o. Allow older child some choice

_____p. Perform procedure in an area away from child's hospital room if possible

TEST

______q. Make sure that parent is present during procedure

______r. Listen to child

______s. Provide privacy during procedure

______t. Explain that you expect child to be brave and not to cry during procedure

______u. Determine whether parent should be present during procedure

______v. If parent is present during procedure, encourage parent to comfort child, but do not allow parent to assist with procedure

______w. Ask another staff member to assist with procedure

6. State nursing interventions that provide emotional support after needle/catheter insertion.

a. ____

b. ____

c. ____

d. ____

e. ____

f. ____

g. ____

7. Select from the following list infusion sites in the infant and child. Write an "X" in the blank before each correct answer.

______a. Upper arm

______b. Underside of wrist

______c. Antecubital fossa

______d. Subclavian vein

______e. Scalp veins

______f. Femoral vein

______g. Dorsal hand veins

______h. Flexor surface of wrist

______i. Femoral artery

______j. Dorsal foot veins

TEST

8. State considerations for selection of insertion site.

    a. ____________________

    b. ____________________

    c. ____________________

    d. ____________________

    e. ____________________

9. Describe physical preparation of child and site for venipuncture.

    a. ____________________

    b. ____________________

    c. ____________________

    d. ____________________

    e. ____________________

10. Discuss selection of equipment for the pediatric patient.

    a. Needle and/or catheter

        1) ____________________

        ____

        2) ____________________

        ____

    b. Tubing

        1) ____________________

        2) ____________________

    c. Accessory equipment

        1) ____________________

        2) ____________________

        3) ____________________

TEST

11. Select from the following list information to know about types of solutions and flow rates for the pediatric patient. Write an "X" in the blank before each correct answer.

______ a. Types of solution frequently ordered for pediatric patients are normal saline, Ringers solution, and 5% dextrose

______ b. Solution type can be changed if nurse thinks it necessary

______ c. Types of solution frequently ordered for pediatric patients are 1/4% to 1/2% saline in 5% to 10% dextrose, 1/2 Ringers Lactate to Ringers Lactate, and balanced electrolyte solutions in dextrose

______ d. Solution type will be ordered by physician

______ e. Electrolyte replacement will occasionally be ordered

______ f. Electrolyte replacement will be ordered frequently

______ g. Flow rates should be adjusted according to amount of fluid loss

______ h. Flow rates based on body weight, age, and surface area will be ordered by physician

12. Discuss venipuncture considerations for the pediatric patient.

a. Procedures similar to adult therapy

1) ____

2) ____

3) ____

b. Procedures specific to the pediatric patient

1) ____

2) ____

3) ____

4) ____

5) ____

6) ____

7) ____

8) ____

TEST

13. State suggestions for use of splints and restraints.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

14. Select from the following list nursing interventions with regard to proper monitoring and maintenance of pediatric IV therapy. Write an "X" in the blank before each correct answer.

______a. Check insertion site at least twice per shift for complications; change insertion site when complications are detected

______b. Take great care in monitoring prescribed flow rate

______c. Change dressing, and cleanse and inspect site every shift

______d. Check insertion site frequently for signs of complications; change insertion site when complications are detected

______e. Protect insertion site from trauma

______f. Monitor intake and output carefully

______g. Regulate flow rate when infant or child is still and calm

______h. Check flow rate once an hour

______i. Change insertion site at least every forty-eight hours

______j. Reinforce need for therapy at every opportunity

______k. Remove dressing, cleanse and inspect insertion site, and redress every twenty-four hours, using same techniques as those used for adults

______l. Change tubing and solution container every forty-eight hours, observing same precaution as that observed with adult

______m. Carefully document all observations, assessments, and actions on appropriate chart form

______n. Assess circulation and sensation of extremity whenever necessary

______o. Check flow rate every thirty minutes to one hour for older infant and child

TEST

_____p. Change insertion site at least every seventy-two hours

_____q. Cover insertion site carefully to protect from injury

_____r. Check flow rate every fifteen to thirty minutes for newborn

_____s. Change tubing and solution container every twenty-four hours, observing same precautions as those observed with adult

_____t. Assess circulation and sensation of extremity frequently

_____u. Use restraints on all infants and toddlers

_____v. Use small volume solution containers (250 ml to 500 ml) whenever possible

15. State methods of enlisting aid and cooperation of parent and child.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

16. State nursing interventions with regard to meeting special needs of the pediatric patient.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

(NOTE: Test questions 17-19 list the assignment and job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

17. Meet emotional needs of pediatric patients.

18. Practice psychological and emotional support for the pediatric patient.

TEST

19. Demonstrate the ability to

    a. Apply a mummy restraint.

    b. Use a rubber band for a scalp tourniquet.

    c. Detect infiltration.

PEDIATRIC IV THERAPY
UNIT XV

ANSWERS TO TEST

1. a. 8
   b. 14
   c. 5
   d. 1
   e. 3
   f. 11
   g. 15
   h. 4
   i. 10
   j. 2
   k. 13
   l. 7
   m. 6
   n. 12
   o. 9

2. Discussion should include the following

   a. Hospitalized child faces many adjustments and new experiences

   b. Illness can create many real, imaginary, and potential threats

   c. Emotional support given before and during IV therapy not only influences present and future development, but also present and future health care

   d. Nursing actions must help minimize stress, aid the child in coping with anxieties and fears, and promote cooperation

   e. Type of support needed will vary with each individual

3. a. 4
   b. 3
   c. 2
   d. 1
   e. 5
   f. 4
   g. 5
   h. 3
   i. 3
   j. 4
   k. 1
   l. 2
   m. 4
   n. 1
   o. 3
   p. 5

ANSWERS TO TEST

4. a. Newborn (birth to three months)
    1) Provide comfort by gentle handling and stroking
    2) Talk to child in calm, soothing, quiet voice

   b. Infant (three to twelve months)
    1) Do not allow anyone other than nurse to provide restraint
    2) Allow parent or nurse to provide comfort to infant by stroking
    3) Talk to child in calm, soothing, quiet voice

   c. Toddler and preschool (one to five years)
    1) Provide support by allowing child to examine and play with nonsterile equipment
    2) Explain to child that it is all right to cry but that he or she must hold very still during procedure
    3) Explain to child that someone will be with him or her during procedure
    4) Make time between explanation and procedure relatively brief

   d. School age (six to twelve years)
    1) Explain procedure
    2) Explain to child that he or she must hold very still during procedure
    3) Allow time for verbal expression of fears and concerns
    4) Provide support by allowing child to examine and play with nonsterile equipment
    5) Provide support by using simple drawings and pictures, and by reading material
    6) Time between explanation and procedure should not be unnecessarily long but should be long enough to allow child to work through feelings

   e. Adolescent (thirteen years to adult)
    1) Explain purpose and procedure
    2) Reassure adolescent that body will not be damaged or changed
    3) Reassure adolescent that sense of independence will be respected
    4) Allow time between explanation and procedure for consideration of explanation
    5) Encourage adolescent to ask questions

ANSWERS TO TEST

5. b, c, e, g, j, l, m, o, p, r, s, u, v, w

6. a. Use positive reinforcement
   b. Allow time for child to adjust to the way IV feels
   c. Listen to and answer any questions
   d. Provide adequate stimulation and activity for duration of therapy
   e. Provide contact and interaction with other people
   f. Encourage parents to maintain normal contact with child
   g. Encourage play

7. c, e, g, h, j

8. a. Use of scalp veins is more frequent for newborns and infants to one year old
   b. Veins in hand and lower arm are readily accessible and allow greater mobility
   c. Avoid use of antecubital fossa unless child can cooperate
   d. With prolonged therapy, use most distal site on an extremity and then proceed up extremity
   e. Veins in feet and legs should be used only when all other sites are inaccessible

9. Description should include the following
   a. Before attempting venipuncture, immobilize extremity if necessary by taping it to a padded splint or a covered sandbag
   b. Immobilize infant before attempting venipuncture
   c. Have another nurse assist child in remaining still
   d. Use same prep agents as those used for an adult
   e. Use the same technique to prepare site as that used for an adult

10. Discussion should include the following
    a. Needle and/or catheter
       1) Use wing-tipped needle for therapy of short duration, for infants and small children, and veins of small size

ANSWERS TO TEST

    2) Use inside-the-needle catheter for therapy of longer duration, and for child of any age but usually older than one year

  b. Tubing

    1) Use microdrip delivery system

    2) Use volume control device if at all possible

  c. Accessory equipment

    1) May use extention tubings to permit greater freedom of movement

    2) May use filters as with an adult

    3) May use infusion pumps for maintenance of precise flow rates

11. c, d, f, h

12. Discussion should include the following

  a. Procedures similar to adult therapy

    1) Insertion technique is essentially same as that used for adult

    2) Taping techniques are essentially same as those used for adult

    3) Labeling of site, tubing, and container is same as that used for adult

  b. Procedures specific to the pediatric patient

    1) An assistant's hand grasped firmly around child's extremity can be an effective tourniquet

    2) Use of a wide rubber band makes an adequate scalp tourniquet

    3) Controlled breathing technique can help calm child and will help keep veins distended

    4) Splints must be well padded and covered with soft, absorbent cloth

    5) Double-faced tape should be used to secure splints

    6) Restraints should be used only if there is a danger that the child will hurt him- or herself

    7) Paper cup can be placed over a wing-tipped needle inserted into a scalp vein

    8) Decorate tape with stickers or pictures

ANSWERS TO TEST

13. a. Immobilization of infant's head can be accomplished with sandbags

    b. Immobilization of an extremity can be accomplished with sandbags, armboards of small size, elbow splints, and mittens

    c. Pinning armboard to bed covers provides a simple restraint

    d. Clove hitch restraint can be used for older children

    e. Restraints must be removed at intervals, and range of motion allowed

14. b, d, e, f, g, j, k, m, o, p, r, s, t, v

15. a. Teach signs of infiltration and phlebitis

    b. Teach reason for and skills needed to monitor flow rate

    c. Teach how to avoid possible injury to site

    d. Teach how to avoid tension on needle/catheter or tubing

    e. Teach how to resume whatever degree of mobility is allowed

    f. Instruct parent and/or child how to call for help

16. a. Body weight should be measured at the same time each day on the same scales

    b. Oral hygiene must be meticulous

    c. Infant's need for sucking must be met

    d. Activities should be planned to maintain level of independence and development, and to provide sensory stimulation

    e. Positive reinforcement for cooperation or attempts at cooperation should be given continually

    f. Help and encouragement should be given often to both child and parent

17. Evaluated to the satisfaction of the instructor

18. Evaluated to the satisfaction of the instructor

19. Performance skills evaluated to the satisfaction of the instructor